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ERRATA

Plate I, fig. 10, read × 1½ for × 3.
Page 24, line 4 from bottom, read more for moe.
“ 70, Figs. 50–55, read *Eumenes caffer* (Linné) for *Eumenes caffer* Saussure.
“ 423, Fig. 4, *Ptfr.*, read postorbital for postfrontal (?postorbital).
“ 435, line 5 from top, read 570 for 750.
“ 534, line 14 from top, read Andersson for Anderson.
“ 586, Figure 2, read *ituriensis* for *iturensis*.
“ 599, No. 40, read *Baikia africana* Gray for *Anopsibæna africanus* (Gray).

THE CONGO EXPEDITION

OF

THE AMERICAN MUSEUM OF NATURAL HISTORY

BY HENRY FAIRFIELD OSBORN

This expedition was planned with the cordial coöperation of the Belgian Government, and it seems appropriate to introduce the series of American Museum publications with a résumé of previous exploration and with a brief account of the large and important scientific work which has been accomplished under the auspices of the Belgian Government, as well as with a reference to the expeditions by explorers under other flags.

RÉSUMÉ OF PREVIOUS EXPLORATION AND PUBLICATION[1]

EARLIER PERIOD (1816–1890)

The scientific exploration of the Congo Basin dates from Captain J. K. Tuckey's ill-fated expedition to the mouth of the River Congo in 1816; most of the members of his party, including the botanist, Christian Smith, died of disease shortly after their arrival in Africa. The meagre results of this first attempt were chiefly botanical.

During the next sixty years progress was very slow, although it was a period of active geographical exploration, with which the following names are identified: R. F. Burton (1862–1863); G. Schweinfurth (1870); J. Monteiro (1873); the German Loango Expedition (P. Güssfeldt, H. Soyaux, E. Pechuel-Loesche, Bastian, 1873–1876); Fr. Naumann (1874); V. Lovett Cameron (1874); Pogge (1875–1884); W. Junker (1876–1883); H. M. Stanley (1876–1888); M. Buchner (1878–1880); A. von Mechow and E. Teusz (1880); H. von Wissmann (1880–1884); R. Böhm and P. Reichard (1880–1884); Casati (1880–1889); H. Johnston (1882–1883); Emin Pasha (1883); H. Capello and R. Ivens (1884); R. Büttner (1884–1886); and Emin Pasha and Fr. Stuhlmann (1890–1891). Owing to the material difficulties encountered at that time, data of scientific value could be gathered only incidentally, so that in 1890 our knowledge of the Congo Basin, its inhabitants and natural productions was still slight.

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[1] This résumé was prepared at the request of President Osborn by Dr. Joseph Bequaert, January 2, 1919.

MODERN PERIOD (1890–1914)

As far as Central Africa is concerned this period of twenty-five years was one of great scientific activity, in which so many explorers and scientists of various nationalities participated that it is practically impossible to enumerate them all. Therefore the following account deals with only the most important contributions. Although it has been the constant policy of the Congo Free State and of the Belgian Colonial Office to aid the scientific labors of all investigators, up to the present by far the greater part of the work has been accomplished by the Belgians.

BELGIAN.—Bia-Franqui Expedition (J. Cornet and P. Briart, 1890–1893); Em. and Marc. Laurent (1893, 1895, 1903–1904); A. Dewèvre (1895–1896); A. Cabra and Fr. Michel (1896–1903); Ch. Lemaire (1899–1900); Commission on Sleeping Sickness (J. Rodhain, C. Pons, F. Vanden Branden, and J. Bequaert, 1910–1912); L. Stappers (1911–1912); E. Hutereau and J. Van der Gucht (1911–1912); A. Pilette (1912-1913); and J. Bequaert (1913–1915).

BRITISH.—J. E. Dutton and J. L. Todd (1903–1905); S. A. Neave (1904–1908); P. H. G. Powell-Cotton (1905–1906); Boyd Alexander and G. B. Gosling (1906); The Ruwenzori Expedition of the British Museum (R. B. Woosnam and A. G. F. Wollaston, 1906); S. and S. A. Neave (1907); E. Torday (1907–1909); C. Christy (1911–1914); and Rogers (1913–1914).

FRENCH.—Du Bourg de Bozas and Dr. Brumpt (1902); A. Chevalier (1902–1903 and 1912); and E. Gromier (1911).

GERMAN.—G. A. von Goetzen and W. von Prittwitz (1894); R. Schlechter (1899); L. Frobenius (1904–1906); S. Ledermann (1906–1908); A. F. Duke of Mecklenburg, H. Schubotz and J. Mildbraed (1907–1908); H. Schubotz (1911); and T. Kassner (1908).

AUSTRIAN.—T. Thonner (1896 and 1909); and F. Grauer (1908).

ITALIAN.—Elena, Duchess of Aosta (1909).

SWEDISH.—A. v. Rosen and R. E. Fries (1911–1912); E. Arrhenius (1913-1915).

AMERICAN.—Th. Roosevelt (1910).

Prior to the organization of the Congo Free State (1885), the Congo Basin was practically *terra incognita* from a scientific point of view. Only fragmentary data had been obtained by the earliest explorers, such as Tuckey, Schweinfurth, Pechuel Loesche, Cameron, Pogge, Capello, and Ivens. At about the time Stanley traced the course of the Congo River, King Leopold II conceived his far-sighted project of opening up to civilization the interior of the "Dark Continent" and from the outset liberally encouraged scientific investigation. The Congo Section of the Brussels Exhibition of 1897 displayed the results of the work accomplished during the previous twenty years, and its collections formed the nucleus of the present Congo Museum at Tervueren, near Brussels, which therefore became the center of research in this field.

By 1914 the principal scientific achievements had been published in quarto form in the famous series of the "Annales du Musée du Congo," comprising by that time fifty-four parts, with about 4600 pages of text and 660 plates. Geology, zoology, botany, and ethnology are all well represented, and the excellence of most of the contributions, in both substance and illustration, is a fitting witness to the high standard set. In addition to these official reports, a literature of almost equal importance, although scattered in various journals, developed through the efforts of Belgian scientific societies and of the leaders in the colonization movement. Foremost among the Belgian contributors were G. Boulenger, J. Cornet, Ph. Dautzenberg, E. De Wildeman, L. Dollo, Th. Durand, J. Fraipont, Ch. Kerremans, Aug. Lameere, Em. Laurent, H. Schouteden, and C. Van Overbergh.

ORGANIZATION OF THE CONGO EXPEDITION OF THE AMERICAN MUSEUM

For many years the late President Morris K. Jesup had entertained the hope that an expedition from the American Museum might be sent to the Congo. Early in 1907, preliminary plans had been discussed with the Secretary General of the Congo Free State, Charles Liebrechts, the negotiations being carried on through the Consul General of the Congo Free State in Baltimore, James Gustavus Whiteley, and the Belgian Consul in New York, Pierre Mali, who was a personal friend of President Jesup. In May 1907, the Director of the Museum, Hermon Carey Bumpus, went to Brussels to confer with the Belgian authorities. King Leopold II generously gave his patronage to the project and graciously presented to the American Museum an ethnological collection from the Congo which now forms an important part of the African exhibits of the Museum.

The plan was taken up again by Henry Fairfield Osborn on assuming the Presidency of the American Museum, and late in the autumn of 1908, a Special Committee on the Congo Expedition was appointed, consisting of Messrs. John B. Trevor, *Chairman*, Hermon C. Bumpus, James Gustavus Whiteley, Robert W. Goelet, Herbert L. Bridgman and Frank M. Chapman. The organization of this committee, and correspondence carried on by President Osborn, M. Carton de Wiart, Director Bumpus and others, gave definite form and impetus to the negotiations, which finally secured the sanction of the Belgian Government to the Museum's exploration of the Congo, and the project became a reality.

The following official letters were exchanged between the Belgian Government and the Director of The American Museum of Natural History.

Légation de Belgique,
Washington, April 2, 1909.

Dear Mr. Bumpus:

In consequence of the conversation between yourself and Mr. Whiteley, when he had the pleasure of meeting you in New York last January, Mr. Whiteley hastened to write to His Excellency, the Minister of Colonies at Brussels, in order to secure the coöperation of the Belgian Colonial Administration with the scientific expedition which the American Museum of Natural History proposes to send to the Belgian Congo.

On my own part I also wrote to His Excellency, the Minister of Foreign Affairs at Brussels, asking him to recommend the proposition which Mr. Whiteley had made to Mr. Renkin.

His Excellency, the Minister of Foreign Affairs, in reply to my letter, requests me, in the name of his Colleague, the Minister of Colonies, to make to the American Museum of Natural History the following proposition:

The Colonial Administration, desiring to encourage the success of the contemplated scientific expedition in the Congo, offers the American Museum the sum of 6,800 francs as a contribution to the expenses of transportation of the American mission in the territory of the Belgian Congo.

The Museum will engage, on its part, to give the Musée du Congo, in Belgium, a participation in the scientific results of the Mission, by sending it specimens of different species of animals which it has not at present in its collection, or which are needed to complete its collections.

The annexed list contains the names of the animals (mammals and birds) which the Museum desires.

His Excellency, the Minister of Colonies, will take pleasure in recommending the American scientists to the good offices of the Colonial authorities, but it will, of course, be understood that the American Museum will have to pay the cost of the maintenance and of the transport of the members of the Mission, and will also provide for all their needs.

I shall be very much obliged, my dear Mr. Bumpus, if you will be kind enough to let me know whether the American Museum accepts this proposition, and in the meantime I beg you to accept the assurance of my high regard.

(Signed) Baron Moncheur.[1]

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[1] Baron Ludovic Moncheur was elected by the Trustees to an Honorary Fellowship in the Museum on May 10, 1909.

New York City,
April 8. 1909.

To His Excellency Baron Moncheur,
Légation de Belgique,
Washington, D. C.

Dear Sir:

I am instructed by Henry Fairfield Osborn, President of the Board of Trustees of The American Museum of Natural History, to acknowledge the receipt of your most courteous favor of April second, conveying the information that through your kind intervention, and also through the instrumentality of the Honorable James Gustavus Whiteley, the attention of His Excellency the Minister of Colonies of the Kingdom of Belgium has been called to our desires concerning scientific work in the Belgian Colony of the Congo, and transmitting a most welcome series of propositions formulated by His Excellency the Minister of Foreign Affairs in the name of His Colleague the Minister of Colonies.

President Osborn wishes especially that the Colonial Administration of the Kingdom of Belgium should be informed that its desire to encourage the success of the contemplated scientific expedition is, in itself, the most important of those factors which will lead to this success. Moreover, he wishes me to say that the contribution of the Colonial Administration—generous, as unexpected—indicates an attitude towards scientific research which is most high-minded and which argues, for those having the affairs of the Colony of the Congo in charge, an administration of caution, of liberality and of wisdom.

The American Museum of Natural History will consider it a privilege to be permitted to share the scientific results of this Expedition to the Congo with the Musée du Congo, in Belgium, and to do everything in its power to develop the collections from the Congo, exhibited, and to be exhibited at Tervueren—indeed, the Trustees of the American Museum desire that they may do much more than is suggested by your formal list of desiderata.

With the utmost gratitude for your most efficient services, and confident that the combined efforts of the Colonial Administration of the Kingdom of Belgium and The American Museum of Natural History will result in the general promotion of science and thus redound to the benefit of all people, I am,

Very respectfully yours,
(Signed) Hermon Carey Bumpus,
Director.

It will be observed in the foregoing correspondence that the Government of Belgium contributed the sum of 6,800 francs ($1,329.13) towards the first year's expenses of field-work (estimated at $11,000) and that the Museum engaged to enrich the collections of the Belgian Colonial Museum at Tervueren. The instructions of the Belgian Government were carried out in a most courteous and obliging manner by the representatives of the Congo Colonial Administration throughout the duration of the expedition.

The expedition was at first financed to the extent of $10,000 through the individual contributions of several Trustees and other friends of the Museum, especially by Messrs. John B. Trevor, Charles Lanier, Cleveland H. Dodge, J. P. Morgan, Jr., William K. Vanderbilt, A. D. Juilliard, Robert W. Goelet, and William Rockefeller.

Mr. Herbert Lang[1] was chosen leader of the expedition and Mr. James P. Chapin of Columbia College volunteered to go as Assistant. At the end of the first year Messrs. Lang and Chapin reported the results, which were far beyond the original expectations, and requested an extension of time.

The expedition ultimately extended over a period of six years, in the course of which very full field reports were made by Mr. Lang from time to time. The total expenditures of the expedition for field work amounted to a very much larger sum than was originally contemplated, namely, $58,000, which was raised as follows:

Contribution by the Belgian Government, (6,800 francs)	$1,329.13
Subscriptions from the Trustees and other friends of the Museum	29,000.00
Appropriations from the Jesup Endowment Fund	27,670.87

It is interesting to recall that the late President Jesup was originally interested in the exploration of the Congo and that through his munificent bequest to the Museum he became the benefactor who made possible the continuation of this work. It is also through the Jesup Fund that the Museum is enabled to issue the series of publications projected.

NARRATIVE OF THE EXPEDITION

The Museum party left New York on May 8, 1909, for Antwerp, and, after receiving additional courtesies and assistance in Brussels, sailed for Boma, arriving there June 22, when the work of the expedition began, as told in the following narrative by Mr. Lang.

"At President Osborn's request the Expedition proceeded without delay to the most promising zoological regions, 1200 to 1500 miles inland, a fact that contributed as much to the success as did the general organization and excellent equipment. There, in the northeastern Belgian Congo, it was hoped we could secure for the proposed African

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[1] Mr. Herbert Lang became connected with the American Museum staff in August 1903, and until 1906 worked upon the faunistic exhibits and habitat groups of North American birds. In 1906 he represented the Museum on the Tjäder Expedition to Africa, the expenses of which were chiefly borne by Mr. Samuel Thorne. In 1907–1908, he worked on the material collected by the Tjäder Expedition and in preparation for the Congo Expedition. During the years 1909–1915 he was in charge of the Congo Expedition. Upon his return he was assigned to the preparation, arrangement and description of the Congo collections as Assistant in Mammalogy. On February 3, 1919, he was appointed Assistant Curator, Department of Mammalogy.

Hall of the Museum the requisite material for habitat groups of the rare Okapi and square-lipped Rhinoceros before their extermination made this impossible On the journey up the Congo River from Leopoldville (July 12, 1909) occasional collecting familiarized us with the more common faunal types. Arriving at Stanleyville August 3, necessary preparations for the porterage and future disposition of loads were made. A month later, the Expedition, with a caravan of two hundred porters, started upon the overland journey through the Rain Forest to Avakubi, on the Ituri River, where, on September 30, we established our permanent base. During the next three months, spent in the vicinity of Avakubi, Ngayu, and Bafwabaka, the collections increased satisfactorily. Our greatest efforts, however, were devoted to training a staff of fifteen natives in various methods of collecting and adequately preserving the material gathered, a measure of utmost importance in regions where the destructive effects of the hot, moist climate had to be met. Such an arrangement later allowed us to give more time to a zoological survey, and on many side trips the preparation of collections could be accomplished with greater facility.

"From January to October 1910, with a base at Medje, we established at least forty camps in the uninhabited rain forest south of the Nepoko River. In October we could report that all necessary data and material for an Okapi group had been obtained. Water-color sketches, several hundred correlated photographs, accessories, including parts of trees, lianas, bushes, samples of soil, and leaf moulds, supplemented by a thorough study of the little-known life history, assured an ideal reproduction of such a group. The general collections also were successfully increased, and reached a total of 1054 mammals, 1885 birds, 829 reptiles and batrachians, 39 fishes, 15,000 invertebrates, and an ethnographical collection of over 700 specimens.

"The Museum authorities generously appropriated funds for a continuation of the work in the savannah country of the Upper Uele, where we established base camps at Niangara, Dungu, Faradje, Aba, Vankerckhovenville, Yakuluku and Garamba, from January 1911–July 1913. The square-lipped Rhinoceros proved fairly numerous here and we were fortunate in obtaining for a habitat group a bull with a 42-inch horn and a female with one 36.25 inches long, records from this region and the largest complete specimens ever collected for exhibition. Short hunting trips were made from Garamba into the Anglo-Egyptian Sudan, with the Sirdar's kind permission, and quite unexpectedly Giant Eland, the largest known antelope, furnished equally splendid material for a similar group. The total results by February 1913 speak for themselves: 3227 mammals, 2244 reptiles and batrachians, 4488 birds, 1606 fishes, 40,000 invertebrates, and an ethnographical collection of 1900 items.

"From then on, the problem of transportation became our chief concern. Over two hundred loads were stored in Medje, the same number in Niangara, besides specimens for several hundred more in Avakubi. In Faradje alone over six hundred loads awaited removal to Stanleyville, the nearest shipping center, by a sixty-five days' march, more than half of which led through dense forest; river transit was out of the question since native dugouts could not be used for objects affected by water. Restrictive measures connected with sleeping sickness had closed the Nile route and the precarious condition of communication in the northeastern Uele made it necessary for the expedition to fashion from the raw material everything needed for packing purposes. Trees were cut, planks sawed, iron ore reduced, nails hammered, and ropes twisted, since the collections could be transferred with safety only when carefully packed in boxes or other well-made parcels. Furthermore, the work was necessarily slow, as the natives recruited in this region would not carry for more than six days, and in the forest only a couple of days, before returning to their respective villages, so that during five years' field work over 38,000 porters were engaged by the Congo Expedition. Then, too, caravans exceeding one hundred porters would have met with difficulties, especially in obtaining provisions.

"Under these circumstances Mr. Chapin chose to supervise the transportation of all collections to Stanleyville and we both left Faradje on February 19, 1913, he taking the direct road to Dungu, while I passed northward to Yakuluku and Bafuka, gathering during the next four months a valuable series of the rare Bongo as well as other material that increased the importance of our data on distribution. In the meantime, two hundred loads had been removed from Niangara, where I joined Mr. Chapin for a week, and on the first of July we parted company at Rungu for the next thirteen months, during which he directed the transfer of nearly 1200 loads to Stanleyville, meanwhile adding to the collections. I proceeded to Nala, Poko, and southward to Niapu, and secured many desiderata, chief among which were series of rare forest mammals. Certain gaps in the study of the Okapi were also filled in, and a calf, intended for the New York Zoological Society, was captured alive, but unfortunately succumbed later, owing to the lack of proper food. I forwarded the new collections together with those which had been stored at Medje for three years, and on July 25 I met Mr. Chapin again near Avakubi. After vacating our base there we left the Ituri district on September 9, passed down the Aruwimi to Banalia by native canoe, proceeded thence by land to Bengamisa, and descended the Lindi River to Stanleyville. We arrived at the last-named place on September 30, after an absence of five years in regions where steam whistles, telegraphs, telephones, and motors were unknown, although Stanleyville, 1200 miles inland, was connected with Europe and the Cape by wireless, and under normal conditions steamers of 500 tons arrived every fortnight. We had traveled about 15,000 miles on foot without accident or sickness, although the unhealthy condition of the country caused the government to reduce the term for resident officials from three to two years.

"Mr. Chapin left Stanleyville for America on December 10, 1914 with the first large shipment of collections, and, passing through Liverpool and London, reached New York on March 31, 1915. I followed in May with the last of the fifty-four tons of material, but at Matadi marine transportation had been interrupted by the war, and not until late in August were all of the collections safely on their way to America. This delay gave an opportunity for a fruitful exploration of the Congo estuary, especially in the neighborhood of Zambi, Malela, Banana and St. Antonio. Leaving Banana for St. Paul de Loanda on September 14, I sailed for New York, via Lisbon, arriving November 12, 1915, after an absence of six years and a half.

"It is interesting to note that by 1909, the first year of the Congo Expedition, the Congo Free State had become a Belgian Colony and King Albert I, at that time heir to the throne and interested in the aspirations and welfare of his people, made a tour of inspection through the Congo Basin. At Stanleyville, September 1909, the Museum's expedition received important advice from various members of the royal advance party, headed by the Minister of Colonies, Jules Renkin. At Brussels, and throughout the Expeditions' travels in Africa, invaluable information and other assistance were given by the following Belgian dignitaries and officials: Prince Albert de Ligne (Attaché); Felix Fuchs, L. Henry (Governors General); M. Malfeyt, A. Lantonnois, A. De Meulemeester, L. Moulaert (Vice-governors); Ed. Kervyn (Director General); H. Droogmans, Mau. Van Damme (Colonial Secretaries); G. Bertrand, Ch. Delhaise, Mau. Siffer, E. Verdick (Commissioners); Ch. Smets (Judge); Dr. Van Campenhout, Dr. E. Etienne, and Dr. J. Rodhain.

"Henry Lane Wilson, American Ambassador to Belgium, and the American Consuls General, William H. Handley and Harry A. McBride, courteously represented and furthered the interests of the Expedition at various times."

Itinerary of the Congo Expedition

1909	May 8	Leave New York	
	June 3	Leave Antwerp	
	June 22	Leave Boma	
	June 24–30	Matadi	
	July 1–12	Leopoldville	
	August 3–September 4	Stanleyville	
	September 12	Bafwaboli	
	September 24	Bafwasende	
	September 30–December 7	Avakubi	
	December 10–26	Ngayu	
	December 27–January 10, 1910	Bafwabaka	
1910	January 13–October 15	Medje	
	October 18	Pawa	
	October 23	Isiro	
	October 26	Nala	
	October 28	Rungu	
	November 1–January 20, 1911	Niangara and vicinity	
1911	January 25–30	Dungu	
1911–1913	February 6, 1911–February 19, 1913	Northeastern Uele—base at Faradje	
1911	July 12–18	Aba and vicinity	Chapin
	August 9–12	Vankerckhovenville	Chapin
	November 2–6	Yakuluku	Lang
	December 10–22	Aba and vicinity	Lang and Chapin
1912	March 10–16	Garamba	Lang
	April 7–24	Vankerckhovenville	Lang and Chapin
	May 4–July 24	Garamba	Lang and Chapin
1913	February 19	Faradje	Lang
	March 2–4	Yakuluku	
	March 12–24	Bafuka	
	June 14	Niangara	
	February 19	Faradje	Chapin
	February 24–March 1	Dungu	
	March 5	Niangara	
	June 14–21	Niangara	Lang and Chapin
	June 24–July 1	Rungu	

	July 6–10	Nala	Lang
	July 15–August 29	Poko	
	September 1–October 31	Akenge	
	November 2–February 20, 1914	Niapu	
1914	February 27–July 22	Medje	
1913	July 1	Rungu	Chapin
	July 5–15	Pawa	
	July 25	Bafwabaka	
	July 27	Ngayu	
	July 31–January 2, 1914	Avakubi	
1914	April 19	Penge	
	April 21	Epulu River	
	July 25–August 1	Babeyru	Lang and Chapin
	August 3	Ngayu	
	August 5–September 9	Avakubi	
	September 10	Bomili	
	September 12	Panga	
	September 22–25	Banalia	
	September 28	Bengamisa	
	September 30	Stanleyville	
	December 10	Left Stanleyville	Chapin
	December 20	Kinshasa	
	December 24	Matadi	
	December 29	Boma	
1915	March 14	Liverpool	
	March 31	New York	
	May 10	Left Stanleyville	Lang
	May 18–22	Kinshasa	
	May 22–31	Leopoldville	
	June 9–16	Matadi	
	June 17	Boma	
	June 17–July 2	Zambi	
	July 2–12	Malela	
	July 19–25	Banana	
	July 25–August 1	St. Antonio	
	August 6–September 14	Banana	
	September 15–October 1	St. Paul de Loanda	
	October 10–November 2	Lisbon	
	November 12	New York	

SUMMARY OF THE COLLECTIONS

The collections are chiefly zoological, representing nearly all branches of natural history of the region traversed. The following is an estimate of the number of specimens which by the middle of November 1915 had reached the Museum safely, in spite of the unsettled conditions and difficulties of transportation due to the war.

Mammalogy	5800
Ornithology	6200
Herpetology	4800
Ichthyology	6000
Invertebrates	over 100,000

Palæontology was represented by only a few specimens referable to ichthyology.

Anthropology—3800 specimens were added to the collection already presented to the Museum by King Leopold II.

The illustrative material includes about 300 drawings, in watercolor and ink, by Mr. Chapin, and a superb collection of 9890 photographs, the property of Mr. Lang, who has, however, placed them on permanent deposit in the Museum. The latter relate to the following subjects:

Anthropology	5461
Mammalogy	2155
Ornithology	512
Herpetology	365
Ichthyology	182
Invertebrate Zoology	294
Botany	483
Miscellaneous	438

The value of this collection is greatly enhanced by the detailed diaries, note-books, observations and measurements taken in the field. The records afford invaluable data for all the zoological and ethnological studies to be published.

PROJECT OF PUBLICATION

The publications at present contemplated are planned in four series, as follows:

1. Scientific Papers published in Bulletin form of the American Museum, of which at present twelve volumes are projected, under the title ZOOLOGY OF THE BELGIAN CONGO. These papers will first be published in the Bulletin. They will then be issued in a special edition of 150 copies as separate volumes.

2. Memoirs of The American Museum of Natural History, of which the volume on the Okapi is in course of preparation.
3. Ethnological Albums, in which the principal anthropological results are to be brought together in three volumes.
4. Narrative of the Congo Expedition, in two volumes, by Herbert Lang and James Chapin.

The division of the scientific material already assigned is as follows.

Mammalogy.—J. A. Allen, N. Hollister, H. Lang, J. P. Chapin, Childs Frick.
  Anatomical Studies.—H. von W. Schulte, C. Sharp, J. Kingsley.
Ornithology.—J. P. Chapin.
Herpetology.—K. P. Schmidt, G. K. Noble.
Ichthyology.—J. T. Nichols, L. Griscom, C. R. Eastman, L. Hussakof.
Invertebrate Zoology.
  Vermes.—G. A. MacCallum.
  Mollusca.—H. A. Pilsbry, J. Bequaert.
  Crustacea.—M. J. Rathbun, H. A. Pilsbry, C. B. Wilson, W. G. Van Name.
  Myriapoda.—R. V. Chamberlin.
  Insects.
    Lepidoptera.—W. J. Holland.
    Coleoptera.—C. W. Leng, A. J. Mutchler.
    Orthoptera.—J. A. G. Rehn.
    Neuropteroids.—N. Banks, J. G. Needham.
    Diptera.—J. Bequaert, C. P. Alexander, J. S. Hine.
    Hymenoptera.—W. M. Wheeler, J. Bequaert, I. W. Bailey, J. C. Bradley, F. E. Lutz.

PROJECT OF INTERNATIONAL RESEARCH

In view of the international character of this exploration and of the generous coöperation of the Belgian Government, it is proposed to make the scientific results as well as the collections as effective as possible in the dissemination of knowledge regarding the natural history and resources of the Congo. Much of the zoological and botanical work will be of real value in relation to the future economic development of this great area of Africa.

The American Museum will begin by selecting, according to agreement, a duplicate collection for the Congo Museum at Tervueren, near Brussels, Belgium. This collection will include not only certain of the more important mammals, birds, and reptiles which are still needed at Tervueren but also, so far as possible, paratypes of the new species described in the series of volumes which will be collectively known as THE ZOOLOGY OF THE BELGIAN CONGO. Thus the Congo Museum at Tervueren will be reinforced in the great work it has accomplished since 1897, the time of its establishment as a center of research in the zoology and ethnology of the Congo. The same principle will apply to the duplication of the American Museum photographs, observations, and records of various kinds which may not be published.

In other words, the American Museum will endeavor, so far as practicable, in every branch of science in which this expedition has engaged, to extend its duplicates and documents for the benefit of its sister institution in Belgium and for the dissemination of knowledge through the opportunities which the Congo Museum at Tervueren offers to the European students and investigators.

American Museum
of Natural History.
June 18, 1919.

BULLETIN

OF

THE AMERICAN MUSEUM OF NATURAL HISTORY

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Article I.—A REVISION OF THE VESPIDÆ OF THE BELGIAN CONGO BASED ON THE COLLECTION OF THE AMERICAN MUSEUM CONGO EXPEDITION, WITH A LIST OF ETHIOPIAN DIPLOPTEROUS WASPS[1]

BY J. BEQUAERT

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[1] Scientific Results of the Congo Expedition. Entomology, No. 2.

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INTRODUCTION

For many years I have been eagerly planning the study of the Hymenoptera of the Belgian Congo, to which I had devoted all my spare time during five years of travel in various regions of Africa. Unfortunately, conditions in Europe deprived me of the fruits of all but a small part of my own collecting. But, coming to America, I found among the splendid collections of the American Museum Congo Expedition such a unique series of Vespidæ that my project, I felt, might be satisfactorily realized. The cordial welcome extended to me by Prof. Henry Fairfield Osborn, President of The American Museum of Natural History, and the great privileges offered then by Dr. Lucas, Director, placed me in such ideal conditions that I was able to devote myself completely to my favorite task. It was a great pleasure for me to be thus associated with Prof. H. E. Crampton, Curator of Invertebrate Zoölogy. To Dr. Frank E. Lutz, Associate Curator of Invertebrate Zoölogy, I am especially grateful for many kindnesses throughout the preparation of this paper and for invaluable advice during publication. Prof. Wm. M. Wheeler, Dean of the Bussey Institution, Harvard University, and Honorary Curator of Social Insects at the American Museum, has offered me much encouragement and, after the completion of the manuscript, most kindly gave me the benefit of his competent criticism. I am indebted to Mr. J. C. Crawford, Dr. J. C. Bradley, and Mr. Nathan Banks for the opportunity of studying various African wasps belonging to the U. S. National Museum, Cornell University, and the Museum of Comparative Zoölogy of Harvard University; also to Dr. H. Brauns in Willowmore, Cape Colony, for sending a collection of South African species.

The collection of Vespidæ made by Messrs. H. Lang and J. P. Chapin, leaders of the American Museum Congo Expedition, contains over 2700 specimens and is, therefore, the most extensive ever made for that group in the Ethiopian Region. From June 1909 to October 1915, they explored the Congo Basin in its entire width from the estuary to the borders of the Anglo-Egyptian Sudan. Although collecting was done everywhere along the journey, the best series fortunately came from regions whose wasp fauna was practically unknown: the Ituri forests and the savannahs of the Northeastern Uele. I have included in this study a few specimens from the Uele which I owe to the generosity of my friend, Dr. J. Rodhain; also a small number of wasps (about 300) which I personally collected during the last months of my stay in the Belgian Congo. These come chiefly from Mount Ruwenzori, the Semliki Forest, the region between Lake Albert Edward and Lake Kivu, and the interesting forests between Lake Kivu and the Lualaba River.

The comparatively large area thus covered by collecting enabled me to study most of the species of diplopterous wasps known from the Belgian Congo. Since many of them were represented by large series and in a perfect state of preservation, I have attempted to review all the Vespidæ of that region. The present publication, therefore, not only gives keys to the genera and species but, in many cases, discusses the limits and characters of the genera and gives new descriptions with detail drawings of species previously named. This was found necessary as many of the common species are still very imperfectly known, the result being that they are often not recognized and are then redescribed as new. Special care has also been taken to include what is known about the life histories of the African wasps, in order to interest field observers in a further study of the subject. The paper concludes with a bibliographic and synonymic list of the Ethiopian diplopterous wasps, originally compiled for my personal use in the preparation of the descriptive list of Congo species. It is published with the hope of saving the time of subsequent workers; it may also contain some useful suggestions as to the taxonomy and synonymy of the group. Since the bibliography and synonymy are treated as completely as possible in this catalogue, I have not repeated the synonyms of the Congo genera and species in the paper itself. Only those references have been given which are necessary to an understanding of the text or which concern non-Ethiopian species.

In order to show how much the collection made by the American Museum Congo Expedition has added to our knowledge of the wasps of the Belgian Congo, the following figures may prove of some interest: including a few species which have been secured by myself, the collection contains representatives of 83 forms considered of specific rank and 24 well-marked color varieties; among these, 21 species and 9 varieties are here described for the first time. Only 25 of the remaining 62 species had hitherto been found within the boundaries of the Belgian Congo, the other 37 species being new for that region. Together with forms previously recorded but which are not represented in this collection, 101 species of Vespidæ are at the present time definitely known to occur in that country (see the table of Ethiopian genera, p. 21). In my opinion, based on my personal collecting experiences, this number gives a fair idea of the wasp fauna of that part of Equatorial Africa; it possesses, therefore, about one-fifth of the total number of Vespidæ described from the entire Ethiopian region.

The text figures have been drawn with a camera lucida by myself, with the exception of Figures 92 to 95, which were made by Mrs. H. Ziska. The two color plates are reproductions of water-colors by Mrs. Edna Beutenmüller. My indebtedness is especially due to Mr. Herbert Lang for his valuable photographs of different phases of wasp life, which are reproduced on Plates III to VI, as well as for the use of his field notes on the same subject. For many students, these will certainly prove to be the most interesting part of this paper.

TERMINOLOGY

As some technical terms found in this paper, although in continual use among modern students of wasps, have not yet reached entomological glossaries, it might be desirable to explain them briefly.

Tyloides is a convenient term which has been used by R. du Buysson[1] for the elongate swellings or tubercles found on the under side of the antennæ in the males of many social wasps, such as *Vespa, Belonogaster, Polistes,* and others. They are shown in Fig. 254, on the under side of the antennæ of *Polistes aquilinus* ♂.

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[1] Ann. Soc. entom. France, LXXII, 1903, p. 268.

The *oculo-malar space* (*spatium oculo-mandibulare*) is the space which separates the inferior angle of the eyes from the insertion of the mandibles. The term *cheek* or *gena* has often been used by recent writers for this part; I believe, however, that this may be a source of confusion. Older entomologists have called that part of the face which separates the clypeus from the inner orbits "cheek." In many Vespidæ, especially in the males of *Polistes*, the shape of these true cheeks is of taxonomic importance and care should therefore be taken to avoid the misuse of that term.[1]

Extensive use has been made, in the descriptions, of characters presented by different parts of the thorax; it may therefore be well to call attention to Figs. 128, 135, and 249, explaining the thoracic terminology. I have accepted the interpretations of Snodgrass [2] for the subdivisions of the mesopleura (p. 253), although I dislike to use the new term *prepectus* for that part of the pleura which has been known for so many years as *epicnemium*.[3] In the difficult genus *Odynerus*, the characters offered by the propodeum (metathorax of H. de Saussure) are of the utmost importance. I have used, for these parts, the names introduced by H. de Saussure more than sixty years ago.[4] A very clear explanation of the structure of the propodeum in *Odynerus* is found also in A. v. Schulthess' Revision of the Vespidæ of Switzerland.[5]

The posterior part of the propodeum, at the articulation of the abdomen, presents on each side of the extensory muscle a flattened, scale- or tooth-like appendage; these two appendages are often enlarged and placed close together on the middle line, forming a *valvula* [6] around the extensory muscle (Figs. 135 and 249, *va*).

The *posttegulæ* are narrow expansions of the lateral posterior angles of the mesonotum, projecting on each side between the tegulæ and the anterior margin of the scutellum. They have been described, though not named, by Spinola.[7] They are variously shaped and often more or less separated by a suture from the mesonotum (Figs. 81, 135, and 214, *pt.*). The term *parategulæ* has also been used by some authors for these organs (A. v. Schulthess).

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[1] J. Pérez, Actes Soc. Linn. Bordeaux, LXIV, 1910, pp. 4–5. I cannot accept the reasons to the contrary given by A. v. Schulthess, Mitt. Schweiz. entom. Ges., XII, 4, 1913, p. 154, footnote.

[2] R. E. Snodgrass. The thorax of the Hymenoptera. Proc. U. S. Nat. Museum, Washington, XXXIX, No. 1774, 1910, pp. 37–91, Plates I–XVI.

[3] *Epicnemial area* or *Epicnemialflur* of F. Kohl.

[4] H. de Saussure, Etudes sur la famille des Vespides, III, Suppl., 1854, pp. 184–186, Pl. XII, figs. 1–3. Synopsis of American Wasps. Smithsonian Miscell. Coll., No. 254, 1875, p. 150.

[5] A. v. Schulthess, Fauna Insectorum Helvetiæ. Hymenoptera, Fam. Diploptera, 1887, pp. 56–57, Pl. II, fig. 14.

[6] A. Ducke, Bol. Mus. Paraense, IV, 4, 1906, p. 656.

[7] Ann. Soc. entom. France, VII, 1838, p. 501, footnote.

In dealing with the venation of the wing I have followed without restriction the nomenclature proposed by Rohwer and Gahan,[1] which is almost exactly that generally used by European hymenopterists.

Unless otherwise stated, the measurements of length are taken from the front of the head to the apical margin of the second tergite; they include head, thorax, and tergites 1 and 2: "(h. + th. + t. 1 + 2)." This procedure is now in general use among students of diplopterous wasps.

NEW SPECIES AND VARIETIES, WITH THEIR TYPE LOCALITIES[2]

Zethus rodhaini.—— Walikale .... p. 33
Labus garambensis.—— Garamba .... p. 51
Eumenes langi.—— Boma .... p. 84
Pachymenes congensis.—— Banana .... p. 88
Nortonia acarophila.—— Faradje .... p. 97
" *tricarinulata.*—— Lubutu .... p. 99
" *malelensis.*—— Malela .... p. 109
Ancistrocerus kisangani.—— Stanleyville .... p. 115
" *zairensis.*—— Banana .... p. 117
Odynerus picturatus.—— Thysville .... p. 137
" *osborni.*—— Walikale .... p. 141
" *cyanopterus* (Saussure), var. *congicus.*—— Avakubi .... p. 146
" *rufoniger.*—— Stanleyville .... p. 164
" *desperatus.*—— Stanleyville .... p. 166
" *ueleensis.*—— Vankerckhovenville .... p. 170
" *alboniger.*—— Thysville .... p. 172
" *sheffieldi* Meade Waldo, var. *marginifasciatus.*—— Faradje .... p. 176
" *congolensis.*—— Boma .... p. 176
" *lateralis* (Fabricius), var. *lateropictus.*—— Boma .... p. 181
" *kabarensis.*—— Kabare .... p. 186
" *chapini.*—— Stanleyville .... p. 188
" *histrionimimus.*—— Banana .... p. 190
" *rhizophorarum.*—— Malela .... p. 192
Synagris cornuta (Linné), var. *rufithorax.*—— Malela .... p. 208
" " " var. *ituriensis.*—— Risimu .... p. 209
" " " var. *flavofasciata.*—— Medje .... p. 210
" " " var. *similis.*—— Medje .... p. 210
" " " var. *maculata.*—— Medje .... p. 210
" *rufopicta* Tullgren, var. *mimetica.*—— Medje .... p. 226
Polistes macrocephalus.—— Walikale .... p. 261

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[1] S. A. Rohwer and A. B. Gahan, Horismology of the hymenopterous wing. Proc. Entom. Soc. Washington, XVIII, 1916, pp. 20–76.

[2] The types of all new species and varieties are deposited in The American Museum of Natural History.

The following names are proposed for the first time in the Catalogue of the Ethiopian Vespidæ:

Odynerus ferruginatus, p. 298, for *Stenodynerus ferrugineus* A. v. Schulthess, 1914; *nec Odynerus ferrugineus* (Radoszkowsky), 1881.

Odynerus meade-waldoi, p. 305, for *Odynerus deceptor* G. Meade Waldo, 1915; *nec Odynerus deceptor* E. Saunders, 1905.

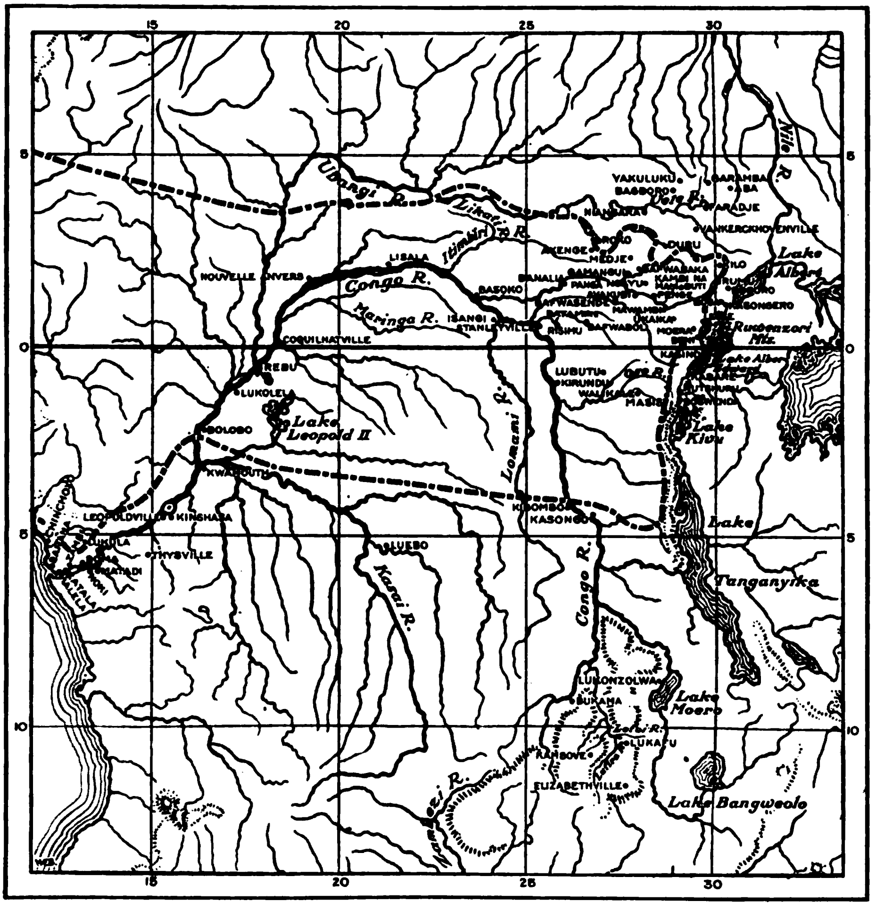
APPROXIMATE LOCATION OF PLACES MENTIONED IN THIS PAPER

Aba (Uele).— 3° 50′ N., 30° 10′ E.
Aka River (Uele).— 3° 50′ N., 29° E.
Akenge (Uele).— 2° 55′ N., 26° 50′ E.
Albert Edward (Lake).— 0° 30′ S., 29° 30′ E.
Aruwimi River.— 1° 20′ N., 24° E.
Avakubi (Ituri).— 1° 20′ N., 27° 40′ E.
Bafwabaka (Ituri).— 2° 10′ N., 27° 50′ E.
Bafwaboli (Stanleyville).— 0° 40′ N., 26° 10′ E.
Bafwasende (Stanleyville).— 1° 10′ N., 27° E.
Bagboro (Uele).— 4° 18′ N., 29° E.
Banalia (Aruwimi).— 1° 30′ N., 25° 40′ E.
Banana (Lower Congo).— 6° S., 12° 20′ E.
Basoko (Aruwimi).— 1° 20′ N., 23° 35′ E.
Batama (Stanleyville).— 1° N., 26° 40′ E.
Bengamisa (Stanleyville).— 1° N., 25° 10′ E.
Beni (Semliki).— 0° 30′ N., 29° 30′ E.
Bogoro (Upper Ituri).— 1° 30′ N., 30° 20′ E.
Boma (Lower Congo).— 5° 50′ S., 13° 10′ E.
Boswenda (Kivu).— 1° 20′ S., 29° 20′ E.
Bukama (Katanga).— 9° 20′ S., 25° 55′ E.
Butagu River (Mt. Ruwenzori).— 0° 30′ N., 29° 50′ E.
Coquilhatville (Equator).— 0° 1′ N., 18° 20′ E.
Duru (Uele).— 3° N., 28° 30′ E.
Epulu River (Ituri).— 1° 20′ N., 28° 40′ E.
Faradje (Uele).— 3° 40′ N., 29° 40′ E.
Gamangui (Ituri).— 2° 10′ N., 27° 20′ E.
Garamba (Uele).— 4° 10′ N., 29° 40′ E.
Irumu (Upper Ituri).— 1° 20′ N., 30° E.
Isangi (Lomami).— 0° 50′ N., 24° 15′ E.
Itimbiri River.— 2° 10′ N., 23° E.
Ituri River.— 1° 30′ N., 26° to 30° E.
Kabare (Kivu).— 0° 35′ S., 29° 30′ E.
Kambi na Mambuti (Ituri).— 1° 20′ N., 29° E.
Kasindi (Kivu).— 0°, 29° 40′ E.
Kasonsero (Semliki).— 1° N., 30° 10′ E.
Katala (Lower Congo).— 6° S., 12° 45′ E.
Kibombo (Manyema).— 4° S., 26° E.

Kilo (Upper Ituri).— 1° 55′ N., 30′ E.
Kinshasa (Lower Congo).— 4° 20′ S., 15° 20′ E.
Kirundu (Ponthierville).— 1° 15′ S., 25° 30′ E.
Kivu (Lake).— 2° S., 29° E.
Kwamouth (Lower Congo).— 3° 20′ S., 16° 10′ E.
Leopoldville (Lower Congo).— 4° 25′ S., 15° 20′ E.
Lesse (Semliki).— 0° 20′ N., 29° 40′ E.
Lisala (Bangala).— 2° 10′ N., 21° 30′ E.
Lubila River (Stanleyville).— 1° N., 26° 30′ E.
Lubutu (Ponthierville).— 0° 40′ S., 26° 40′ E.
Luebo (Kasai).— 5° 25′ S., 21° 25′ E.
Lukula (Lower Congo).— 5° 25′ S., 13° E.
Malela (Lower Congo).— 6° S., 12° 40′ E.
Masisi (Kivu).— 1° S., 28° 30′ E.
Matadi (Lower Congo).— 5° 50′ S., 13° 35′ E.
Medje (Ituri).— 2° 25′ N., 27° 30′ E.
Niangara (Uele).— 3° 40′ N., 27° 50′ E.
Noki (Angola).— 5° 50′ S., 13° 30′ E.
Nouvelle Anvers (Bangala).— 1° 40′ N., 19° 10′ E.
Oso River (Ponthierville).— 1° S., 27° 20′ E.
Panga (Aruwimi).— 1° 45′ N., 26° 15′ E.
Penge (Ituri).— 1° 25′ N., 28° 15′ E.
Poko (Uele).— 3° 10′ N., 26° 50′ E.
Risimu (Stanleyville).— 1° N., 26° 45′ E.
Rutshuru (Kivu).— 1° 15′ S., 29° 30′ E.
Ruwenzori (Mount).— 0° 30′ N., 29° 50′ E.
Semliki River.— 0° to 1° N., 29° 30′ E.
Stanleyville.— 0° 30′ N., 25° 15′ E.
Thysville (Lower Congo).— 5° 30′ S., 15° E.
Uele River.— 3° 30′ N., 23° to 30° E.
Vankerckhovenville (Uele).— 3° 20′ N., 29° 20′ E.
Walikale (Ponthierville).— 1° 25′ S., 28° E.
Yakuluku (Uele).— 4° 20′ N., 28° 50′ E.
Zambi (Lower Congo).— 6° S., 12° 50′ E.

On Specific Characters in the Vespidæ

In the course of the work preparatory to this paper, all the previous descriptions of African wasps were compiled. In looking over the list in the second part, it will be noted that many forms described as "species" have been referred to others previously named, either as mere synonyms or as color variations. The list contains, nevertheless, a large number of names to which at present specific rank must be given, although further study will enable us to unite many of them. In some cases, where the description was made exclusively on the color pattern, it will hardly be possible ever to reach a definite conclusion. This is especially true for the species described by F. Walker in 1871, of which the types are lost.[1]



Map of the Congo Basin, showing localities mentioned in the present paper, and their location in the forest or in the savannah. The broken line indicates the limits of the West African rain forest, forming a broad, continuous belt on both sides of the Equator. (Compare with the botanical map, p. 19).

During the past months I have given most of my time to a study of the diplopterous wasps including species from other parts of the world. I became gradually convinced that the chief characters for separating the species of this group must be sought in structure and sculpture, and that the color of the integument has scarcely any value for this purpose. I feel confident that every student of the group, who works with extensive material, will reach the same conclusion. There may be some species in which the color markings are very constant in a large number of specimens and over an extended geographic area, but these are exceptional cases. As a rule, types which are remarkably fixed in their morphological peculiarities present a very great variation with regard to coloration and also to size. When such types have a wide geographic range, this variation may become almost inexhaustible. Good illustrations of this fact are given by such common forms as *Eumenes maxillosus* (de Geer), *Eumenes caffer* (Linné), and *Synagris cornuta* (Linné).

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[1] W. Innes Bey, Bull. Soc. entom. d'Egypte, (1911), fasc. 3, 1912, pp. 97–98.

It may be held that the differences in the coloration between forms, which on morphological characters must be included in the same species, are very often strong enough to justify the use of a distinct name. This is perfectly true; but it does not imply that such color forms have to be given specific rank, even when they inhabit widely distant countries. The limits of taxonomic forms will, of course, always be a matter of convenience; yet it must be remembered that systematic studies have not the purpose of giving to each specimen a definite name; they are the indispensable starting-point for biological work and for the study of geographic distribution; and in many cases also the only solid foundation for the study of fossil forms and for inquiries into the genesis of the living species.

There is evidence enough at the present time that all the characters of a species are subject to individual variation within certain limits. The study of this variation constitutes the only proper way to know a species. This, however, implies the examination of an extensive series of each species and it will undoubtedly become, sooner or later, the chief purpose of Entomology to bring together such data rather than to overestimate the value of isolated type specimens. Although very little has so far been done in this direction, personal experience has led me to the following conclusions[1] with regard to the diplopterous wasps —

1. The variation of the same character is very different from one group to another; as regards this, there is no general rule. A certain character or complex of characters may afford through its almost absolute fixity excellent specific or generic distinctions in one group, whereas in another group the great variation of such characters makes them almost useless taxonomically. This is true for structural peculiarities as well as for color.

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[1] **It must be well understood that these conclusions do not necessarily apply to any other group of insects, not even to other Hymenoptera.**

2. Structural characters include the shape and sculpture of the different organs of the insect, and also the pilosity, since this is only a part of the integument. Among the diplopterous wasps most of these characters are rather constant. An exception to this rule is the wing venation, or at least certain parts of it; the shape of the cubital cells is extremely variable and in some cases not even of specific value. Another good illustration of variable morphological characters is the protuberances at the base of the mandibles in the male *Synagris cornuta* (Linné).

3. The variation of the color markings is always much greater than that of the structural characters. In many cases we may find an almost constant structural type presenting numerous, different color varieties; it seems evident that these color forms are genetically related; the color characters may be more recent and therefore less stable, or they may be more subject to modifications under the influence of external factors. At any rate, they may be considered as different clothes worn by the same morphological type, this type being of monophyletic origin. The problem becomes still more interesting when we note the occurrence of the same color pattern, the same cloth, in very different morphological types, often belonging to different genera. This remarkable phenomenon is of frequent occurrence among diplopterous wasps. Very often different species of the same zoögeographic area offer, in fact, such a deceiving similitude in their color pattern that the student has to put the color decidedly in the background in order to classify them properly. Many illustrations of such "mimetic" color groups will be given in this paper, but I have some doubts as to whether protective mimicry is sufficient to explain the phenomenon.

The foregoing remarks will, I think, show that I clearly recognize the value of recording and describing the color variations among wasps. If I do not give them specific rank it is because I believe that they are subordinate to the morphological characters. The taxonomist must find some way to express these relationships clearly and the use of trinomials seems to be in many respects the least objectionable.

Therefore, I use the word *species* in the sense in which it is employed by many recent students of Hymenoptera and which is usually associated with the Vienna School. A species includes a complex of forms belonging to the same genus and agreeing constantly[1] in sculptural and plastic characters, although color and pattern may be very variable. The different color variations of such a morphological species are simply referred to as *varieties* in the present paper, because this term is vague and neutral enough not to imply any presumption as to the true status of such color forms, whether they are geographic races or merely individual aberrations, or "elementary species." The term *subspecies* has been avoided because certain authors restrict it to a complex of forms of the same species, as defined above, agreeing constantly in color or pattern and inhabiting the same geographic area[1]; whereas others use the same term for subdivisions of the species presenting slight differences in form and sculpture.[2]

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[1] Within the limits of individual variation.

Particular attention has been paid in this paper to a determination of the different color forms of a given morphological type, and many suggestions have been made with regard to this. It is, however, scarcely to be expected that all the conclusions I have reached will prove to be exact. A very valuable contribution to the subject would be the examination of the types of the different species whose synonymy is here either positively asserted or merely suggested.

SOME REMARKS ON THE CLASSIFICATION OF THE DIPLOPTEROUS WASPS

The classification used here is, in many respects, different from that generally accepted for the diplopterous wasps. I hope to have, at some time in the future, an opportunity of discussing in detail the various reasons which have brought me to my present views on this subject. The following is only a summary of my conclusions.

Since no Masaridæ have been found, so far as I know, within the boundaries of the Belgian Congo, I had little opportunity of studying this group. However, Prof. J. Chester Bradley, who has recently completed a revision of the taxonomy of the Masaridæ, has kindly informed me that he cannot accept this group as a family distinct from the rest of the Diploptera. All the diplopterous wasps which are not masarids have generally been divided, since Latreille's time, according to their habits into two main groups which have been called either families or subfamilies: the Eumenidæ or Eumeninæ for the solitary species, and the Vespidæ or Vespinæ including all the forms with social habits. It is not difficult to show that such a division gives no adequate picture of the phylogeny of the group; in fact the solitary as well as the social wasps are polyphyletic. It is, therefore, not surprising to find that no morphological characters can be discovered which might enable one to place a given species with certainty either with the social or with the solitary wasps.

There is, indeed, much to say in favor of including all the diplopterous wasps in a single family Vespidæ, which may then be subdivided into a number of subfamilies, corresponding to as many phylogenetic strains. It is obvious that such a classification will undergo many modifications with a further study of the evolution of the group. I believe, however, that a first attempt in this direction is not untimely. I propose, therefore, to divide into eight subfamilies those diplopterous wasps which were formerly included in the "Eumeninæ" and "Vespinæ." These subfamilies are briefly characterized below. According to Prof. Bradley's views, the members of the old "family" Masaridæ should form two additional subfamilies in this series:

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[1] W. A. Schulz, Spolia Hymenopterologica, 1906, p. 5.

[2] Wm. M. Wheeler, Ants, 1910, p. 131.

The Euparagiinæ, include *Euparagia* Cresson, *Paramasaris* P. Cameron, *Plesiozethus* P. Cameron, *Paragia* Shuckard, *Metaparagia* G. Meade Waldo. Twenty-seven species, in the Nearctic (2), Neotropical (1), and Australian (24) regions.

The Masarinæ, include *Masaris* Fabricius, *Masariella* H. Brauns, *Ceramius* Latreille, *Celonites* Latreille, *Jugurtia* Saussure, *Quartinia* Gribodo, *Ceramiopsis* Zavattari, *Trimeria* Saussure, and *Pseudomasaris* Ashmead. Sixty-nine species, in the Palearctic (21), Nearctic (10), Ethiopian (31), Oriental (1), and Neotropical (6) regions.

1. RAPHIGLOSSINÆ.— Clypeus rounded, broadly truncate, or emarginate at the apex. Mandibles short and broad, closed underneath the clypeus, with a truncate, toothed apex. Apical joints of the antennæ in the male normal. Tarsal claws bifid. Middle tibiæ with one or two apical spurs. Second and third cubital cells of the front wings each receiving a recurrent nervure.

There are 14 species belonging to 4 genera: *Raphiglossa* S. Saunders, *Psiliglossa* S. Saunders, *Pararhaphidoglossa* A. v. Schulthess, and *Gayella* Spinola. The Mediterranean subregion has 8 species; the Ethiopian region, 4 species; Central America, 1 species; and Chile, 1 species.

Psiloglossa simplicipes Rohwer,[1] from New Mexico, does not belong here, but is an *Euparagia*. The longitudinal plaiting of the front wings is very obsolete in *Gayella;* in fact I was unable to discover any trace of it in the two specimens I have seen. It is possible that this genus must be removed from the Raphiglossinæ.

So far as known, the habits of the members of this group are truly solitary.

2. ZETHINÆ.— Clypeus rounded, truncate, or emarginate at the apex. Mandibles short, obliquely truncate and toothed at the apex, folding above each other underneath the clypeus or very slightly crossing. Antennæ

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[1] Entom. News, XX, 1909, p. 357.

of the male of variable shape. Tarsal claws bifid. Middle tibiæ with one or two apical spurs. Second cubital cell of the front wing receiving both recurrent nervures. First abdominal segment more or less petiole-shaped.

There are 217 species distributed throughout the tropical parts of the world: 4 in the Palearctic, 2 in the Nearctic, 27 in the Ethiopian, 36 in the Oriental and Australian, and 157 in the Neotropical regions. They belong to the following genera: *Zethus* Fabricius (including *Zethusculus* Saussure, *Didymogastra* Perty, *Heros* Saussure, *Calligaster* Saussure, *Wettsteinia* Dalla Torre, and *Laboides* Zavattari), *Pseudozethus* Perkins, *Ischnocœlia* Perkins, *Elimus* Saussure, *Macrocalymma* Perkins, *Discœlius* Latreille, *Labus* Saussure, *Paramischocyttarus* Magretti, *Ischnogasteroides* Magretti, *Pareumenes* Saussure, and *Zethoides* Fox.

What little is known of the habits shows that the Zethinæ are solitary wasps; although some species undoubtedly indicate a tendency towards communistic life.

3. EUMENINÆ.— Clypeus rounded, truncate, or emarginate at the apex, rarely pointed. Mandibles more or less elongate, either crossing each other to form a distinct X or placed parallel to each other in a long and sharp beak; always projecting over the apex of the clypeus; their long inner margin with more or less distinct teeth or notches. Antennæ in the male of variable shape. Tarsal claws bifid or toothed, very exceptionally simple. Middle tibiæ with one, rarely with two spurs, or without any spurs at all. Second cubital cell receiving both recurrent nervures.

About 1900 species, from all parts of the world: 337 in the Palearctic, 223 in the Nearctic, 338 in the Ethiopian, 513 in the Oriental and Australian, and 488 in the Neotropical regions. The following genera belong in this subfamily: *Eumenes* Latreille, *Katamenes* Meade Waldo, *Ectopioglossa* Perkins, *Pseudochilus* Saussure, *Ctenochilus* Saussure, *Pachymenes* Saussure, *Nortonia* Saussure, *Antezumia* Saussure, *Parazumia* Saussure, *Montezumia* Saussure, *Monobia* Saussure, *Monerebia* Saussure, *Plagiolabra* A. v. Schulthess, *Odynerus* Latreille, *Ancistrocerus* Wesmael, *Pterochilus* Klug, *Gribodia* Zavattari, *Synagris* Latreille, *Rhynchalastor* Meade Waldo, *Alastor* Lepeletier, *Paralastor* Saussure, and *Alastoroides* Saussure.

The Eumeninæ are true solitary wasps; in certain species there is evidently a progression towards social habits, similar to that found in some *Zethus*.

4. STENOGASTRINÆ.— Clypeus projecting in a rounded or sharp point. Labial palpi 4-jointed, maxillary palpi 6-jointed. Mandibles slender, often elongate and beak-like, toothed along the inner margin in both sexes or unarmed in the male. Antennæ 12-jointed in the female and worker; 13-jointed in the male, the apical joints in this sex normal (as in the female).

Tarsal claws with a distinct tooth. Middle tibiæ with two apical spurs. The three cubital cells of the front wings are about of equal size, the second and third being unusually large and rectangular; the two recurrent nervures received by the second cubital cell. Anal lobe of the hind wings well developed. Mesepisterna divided by a distinct median episternal groove into an upper and a lower plate. First abdominal segment narrowly petioliform.

The only genus, *Stenogaster* Guérin (= *Ischnogaster* Guérin), contains some 30 species from the Oriental and Australian regions.

The ethology of the members of this subfamily is exceedingly interesting and accurate observations on them would be of much value. Some species are known to be typical social wasps, building many-celled paper nests, very similar to those of *Polistes* and *Ropalidia*, with the cells arranged in a few superposed combs not included in a cover. It is not known whether there is a real distinction between the fertile females and workers. As to the manner in which new nests are started and the food given to the larvæ, we must also await further investigation. However, it has been claimed, apparently with reason, that some of the larger species have solitary habits, each female taking care of a nest of her own.

5. EPIPONINÆ.— Clypeus as a rule as broad as, or broader than, long, its apex pointed or ending in two small teeth; rarely longer than broad and truncate at the apex. Mandibles short and broad, toothed at the truncate apical margin, folded over each other underneath the clypeus. Antennæ in most of the genera 12-jointed in the female and worker; 13-jointed in the male, the apical joints in this sex normal or deformed; exceptionally the antennæ may be 11-jointed in the female and worker, 12-jointed in the male. Tarsal claws simple. Middle tibiæ as a rule with two apical spurs, very rarely with a single spur. Wing venation of the ordinary type, the second cubital cell receiving both recurrent nervures; the hind wings with a well-developed anal lobe. Extensory muscle of the abdomen fixed on the thorax in an oval valvula between the apical scales of the propodeum, the slit always broadly rounded at its upper angle. Thorax and abdomen variously shaped.

About 170 species, which are almost restricted to the tropical portions of the globe: 122 in the Neotropical, 37 in the Ethiopian, 10 in the Oriental and Australian, and 2 in the Nearctic regions. The genera are as follows: *Pseudochartergus* A. Ducke, *Protopolybia* A. Ducke, *Protonectarina* A. Ducke, *Caba* R. von Ihering (= *Nectarina* Shuckard), *Myrapetra* A. White (= *Polybia* Lepeletier), *Chartergus* Lepeletier, *Charterginus* Fox, *Clypearia* Saussure, *Metapolybia* Ducke, *Synœca* Saussure, *Synœcoides* Ducke, *Epipona* Latreille (= *Tatua* Saussure), *Mischocyttarus* Saussure, *Apoica* Lepeletier, *Polybioides* R. du Buysson, *Parapolybia* Saussure, *Leipomeles* K. Mœbius, *Gymnopolybia* A. Ducke, *Stelopolybia* A. Ducke, *Parachartergus* R. von Ihering, *Pseudopolybia* Saussure, and *Belonogaster* Saussure.

This group is rather heterogeneous and will probably be further subdivided. All the species are true social wasps, but in some genera there is as yet no distinction between fertile females and workers. There are monogynous and polygynous species among them; and, in some cases, new nests are started by regular swarming. The architecture of the nests also varies very much, but always belongs to the same type within the limits of a genus. The nests are always aerial, built in the open or inside some cavity; the cell combs are sessile or pedunculate, and may be freely exposed or surrounded by a cover. The nests are generally built of vegetable fibres worked into a papery substance; exceptionally, part of the nest is made of clay. Some species store honey, but we do not know with certainty whether or not it is used to feed the larvæ.

6. Ropalidiinæ.— Clypeus broader than long, its apical margin only feebly projecting in the middle into a blunt or rounded point. Mandibles short and broad, their truncate apex sharply toothed, folding over each other underneath the margin of the clypeus. Labial palpi 4-jointed; maxillary palpi 6-jointed. Antennæ 12-jointed in the female and worker; 13-jointed in the male, in this sex the apical joint is normal or feebly curved. Tarsal claws simple. Middle tibiæ with two apical spurs. Wing venation of the ordinary type, the second cubital cell receiving both recurrent nervures; the hind wings with a well developed anal lobe. No median episternal groove subdividing the mesepisterna. Extensory muscle of the abdomen fixed on the thorax in a narrowly compressed valvula. Second abdominal segment bell-shaped, its tergite and sternite completely or for the most part fused.

There are about 132 species, which are only found in the tropical and subtropical parts of the Old World: 41 in the Ethiopian and 91 in the Oriental and Australian regions. They belong to three genera: *Ropalidia* Guérin (= *Icaria* Saussure), *Anthrenoida* A. White, and *Paraicaria* Gribodo.

Typical social wasps, building paper nests composed of a single pedunculate comb of cells, not enclosed in a cover. There is a distinction between fertile females and workers; often several females start a nest together. The larvæ are fed with animal juices (p. 248).

7. Polistinæ.— Clypeus ending in a pointed angle, rarely rounded or almost truncate in some males. Mandibles short, quadrate, their apices truncate and sharply toothed, folded over each other underneath the clypeus. Labial palpi 4-jointed, maxillary palpi 6-jointed. Antennæ 12-jointed in the female and worker; 13-jointed in the male, the terminal joints in this sex either spirally rolled up or nearly normal. Tarsal claws

simple. Middle tibiæ with two apical spurs. Wing venation of the normal type, the second cubital cell receiving both recurrent nervures. Hind wings with a well-developed anal lobe. Extensory muscle of the abdomen fixed on the thorax in a narrow and much compressed valvula between the apical scales of the propodeum.

About 153 species, distributed all over the world: 6 in the Palearctic, 15 in the Nearctic, 21 in the Ethiopian, 64 in the Oriental and Australian, and 51 in the Neotropical regions. Two genera: *Polistes* Latreille and *Gyrostoma* Kirby and Spence.

These are true social wasps, with a differentiation into castes: fertile females, workers, and males. The species are, as a rule, monogynous, although several females have been observed to start a nest together. The paper nest consists of a free, pedunculate comb of cells. The larvæ are fed with animal matter; some species are known to store small quantities of honey (p. 257).

8. VESPINÆ.— Clypeus broadly truncate at the apical margin, which is feebly emarginate or ends in two slight lateral teeth. Mandibles short and broad, closed over each other underneath the clypeus, their apex truncate, broad, sharply toothed. Labial palpi 4-jointed, maxillary palpi 6-jointed. Antennæ 12-jointed in the female and worker; 13-jointed in the male, the apical joint in this sex normal. Tarsal claws simple. Middle tibiæ with two apical spurs. Wing venation of the ordinary type, both recurrent nervures being received in the second cubital cell; hind wings entire at the base, without anal lobe. No median episternal groove on the episterna of the mesopleura. First abdominal segment subsessile, broadly truncate at the base, with a distinct sharp or rounded angle between its anterior vertical and its posterior horizontal face.

Two genera, *Vespa* Linné and *Provespa* Ashmead, with 53 species: distributed over the Palearctic (16), Nearctic (13), Oriental and Australian (30) regions. One very doubtful species has been described from East Africa, and another reaches Southern Arabia.

These are the most typical of the social wasps. So far as known, the species are monogynous, the new colony being started by a single fecundated female. There is a distinct caste of unfecundated females or workers, which, however, sometimes produce parthenogenetic eggs. The nest is composed of several superposed combs of paper cells and is always enclosed in a cover; it may be placed under the ground, in some cavity, or hang freely in the air. One species, at least, does not build a nest of its own, but lives as an inquiline in the nests of other species and has no worker caste. The food of the larvæ consists of animal juices.

PECULIARITIES OF THE ETHIOPIAN WASP FAUNA

As generally recognized by zoölogists, the limits of the ETHIOPIAN REGION include continental Africa south of the tropic of Cancer, the southern half of Arabia, Sokotra, Fernando Po and the other islands of the Guinea Gulf, Madagascar with the Mascarenes and the adjacent islands from Rodriguez to the Seychelles. Towards the north, the Ethiopian region is very sharply separated from the Mediterranean part of the Palearctic region by a broad belt of deserts. It is a matter of personal opinion whether these deserts themselves may be called Ethiopian or Palearctic. They seem to present still some affinities with the Ethiopian region; and, in former times, when the dryness of the climate was not so pronounced as nowadays, the fauna and flora of the Sahara may have been even chiefly Ethiopian. At the present time, however, few of the Ethiopian animals occur north of the tropic of Cancer.[1]

There is still some discussion as to a further subdivision of the Ethiopian region from a zoölogical viewpoint. The separation of Madagascar and the adjacent islands into a special MALAGASY SUBREGION is in general favor. Most of the zoölogists accept also a well characterized WEST AFRICAN or GUINEAN SUBREGION (Reichenow's West African forest region). It has long been believed that there was, furthermore, a sharp contrast between the fauna of East Africa and that of South Africa; but many of the genera which were considered by Wallace [2] as peculiar to a "South African subregion" have since been found north of the Zambesi, even in Abyssinia and the Sudan.[3] There seems now to be a general tendency to unite the Sudan, East and South Africa into a single main division, as Reichenow [4] has suggested.

In the absence of an authoritative recent work dealing especially with the distribution of African animals in general, it has seemed more convenient to present a map (p. 19) of the botanical regions of that continent. This map is based on the latest publications of A. Engler,[5] and may be useful for the study of the distribution of animal life also.

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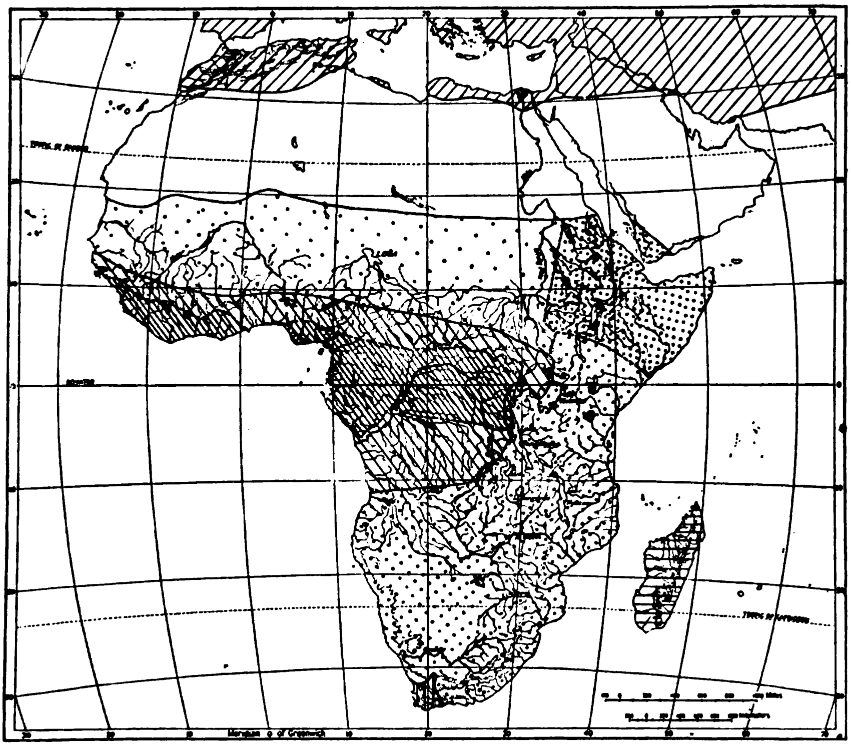
[1] According to E. Hartert, Novitates Zoologicæ, XX, No. 1, 1913, p. 20, no tropical animals occur in Tidikelt, whereas the fauna of northern Aïr is decidedly tropical.

[2] A. R. Wallace, The Geographical Distribution of Animals, I, New York, 1876, pp. 258–269. F. E. Beddard, A Text-Book of Zoogeography, Cambridge, Engl., 1895, pp. 101–102, follows Wallace.

[3] A Reichenow, Journ. f. Ornithologie, XXXIV, 1886, p. 396. R. Lydekker, A Geographical History of Mammals, Cambridge, 1896, p. 261.

[4] A. Reichenow, Die Vögel Afrikas, I, Neudamm, 1900, p. lxxxvii, with map.

[5] A. Engler, Pflanzengeographische Gliederung von Afrika. Sitz. Ber. k. Preuss. Ak. Wiss. Berlin, 1908, II, pp. 781–837. Die Pflanzenwelt Afrikas insbesondere seiner tropischen Gebiete, I, Leipzig, 1910.



BOTANICAL REGIONS OF AFRICA

(After Engler)

I. Mediterranean Region .... ▨
II. North African-Arabian Desert Region .... □
III. Ethiopian Region
  A. Savannah Province
    1. Sudanese Subprovince .... ░
    2. Northeastern Subprovince .... ▒
    3. Eastern and Southern Subprovince .... ⁘
  B. Western Forest Province .... ▧
    Extent of Rain Forest indicated thus .... ▩
IV. Southwestern Cape Region ... . ▥
V. Malagasy Region .... ▤

The MEDITERRANEAN REGION of this map is merely a part of the Palearctic region, and this is also true as regards its fauna. The NORTH AFRICAN-ARABIAN DESERT REGION possesses a truly African flora, its northern limits corresponding with those of the striking genus *Acacia*. The flora of the MALAGASY REGION is very peculiar and this agrees entirely with the characteristic features of its fauna. The vegetation of the small SOUTHWESTERN CAPE REGION is also different from that of the rest of the African continent; it is surprising that the fauna of this very limited area does not seem to present many peculiar forms. The rest of the African continent, to which the name ETHIOPIAN REGION has been restricted on this map, possesses a rather uniform vegetation. Its WESTERN FOREST PROVINCE may also be known as the Guinean province and is chiefly covered with forest. The rain forest forms a continuous belt under the equator, stretching from the Gulf of Guinea to the thirtieth meridian. Areas of grass land extend north and south of this forest belt, interrupted by forest galleries with a typical West African flora. Beyond the Western Forest province, to the north, the east, and the south, grass land predominates. As a rule the plant growth agrees with the œcological definition of a savannah: i. e., a grass land with scattered shrubs and medium-sized trees[1]; though local, edaphic, and climatic conditions produce much variety in the size of the woody vegetation and the proportion between trees and grass. In various parts of this SAVANNAH PROVINCE we even find limited patches of true tropical rain forest in the lowlands (Usambara) or of temperate rain forest in the montane region of the higher mountains (Kilimanjaro, Kenia, Ruwenzori, etc.). However, the flora of these forest patches shows little affinity with that of the West African rain forest. A further subdivision of the Savannah province into a SUDANESE, a NORTHEASTERN, and an EASTERN-AND-SOUTHERN SUBPROVINCE is of much less importance and only mentioned here for the sake of completeness.

The peculiarities of the Ethiopian wasp fauna may be best understood from a comparison with other portions of the globe. I have, therefore, shown in a table (p. 21) how the Ethiopian genera of Vespidæ are represented in the various zoögeographic regions of the world. These figures, and also the total number of Vespidæ occurring in each region, have been especially compiled for this paper. I have added the approximate extension in square miles of the regions because I believe that their relative size is a factor of importance if we want to appreciate duly the richness of their faunæ.

The diplopterous wasps, together with the Formicidæ, are more predomi-

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[1] E. Warming. Œcology of plants. English edition. Oxford, 1909, p. 295.

Total Number of Known Species in the Various Regions

Ethiopian genera of Vespidæ	Belgian Congo	Ethiopian	Oriental and Australian	Palearctic	Nearctic	Neotropical	Total
Masaris		3		1			4
Masariella		1					1
Ceramius		15		5			20
Celonites		9		8			16
Jugurtia		1		4			5
Quartinia		2	1	3			6
Raphiglossa	1	4		5			8
Zethus	1	4	10		2	154	170
Elimus		1	2				3
Pareumenes		1	6				7
Paramischocyttarus	1	3					3
Ischnogasteroides		1					1
Labus	3	17	5				22
Eumenes	5	25	65	18	10	126	240
Pachymenes	2	13	10		2	24	48
Pseudochilus		1					1
Nortonia	8	18		1		2	21
Ancistrocerus	6	19	29	54	57	91	250
Montezumia		1				29	30
Odynerus	33	221	281	217	131	165	1010
Pterochilus	1	9	6	41	20		76
Synagris	18	24					24
Rhynchalastor	1	2					2
Alastor		4	1	5		18	28
Belonogaster	9	35	1				35
Polybioides	2	2	2				4
Ropalidia	3	41	89				130
Polistes	7	21	63	6	15	51	152
Vespa		2	28	16	13		51
Total number of Vespidæ (including the non-Ethiopian genera)	101	500	800	391	268	827	2760
Number of genera	16	29	35	16	13	40	81
Approximate area in square miles	900,000	11,500,000	7,000,000	14,000,000	6,500,000	5,500,000	44,500,000

nant in hot regions than the other groups of Hymenoptera. According to A. Handlirsch's[1] calculation, nearly two-thirds (1763) of the described species of Vespidæ (2768) are found in the tropical parts of the world; while the remaining species are nearly equally divided between the cold temperate (468) and the warm temperate or subtropical (591) regions. There is a striking difference in this respect between the Vespidæ and some of the other Hymenoptera, such as the Chalastogastra, Ichneumonidæ, and Apidæ. The partiality of the Vespidæ for warm climates further appears from the fact that about one-half (46) of the total number of genera (81) are exclusively tropical, whereas only 17 genera are restricted to cold temperate or subtropical regions. If we enter the colder regions of the globe, the diplopterous wasps become gradually scarcer. In Europe and North America, the genera *Vespa, Eumenes,* and *Odynerus* have the most northern range, invading even true arctic regions. In Lapland, at about 70° N. lat., 8 species of *Vespa,* 8 of *Odynerus,* and the widely distributed *Eumenes coarctatus* (Linné) have been found.[2] Two species of *Vespa* and one of *Odynerus* are recorded from Alaska[3]; I have seen *Vespa norwegica* (Fabricius) from Point Barrow, north of 70° N. lat.

I have indicated before, in their broad lines, the areas covered by each of the ten subfamilies which I have come to recognize among the Vespidæ. To repeat this briefly: the Eumeninæ and Polistinæ are cosmopolitan groups; the Masarinæ, though widely distributed, are almost restricted to subtropical regions where they inhabit various disconnected areas; the Epiponinæ and Zethinæ are tropicopolitan, and the Raphiglossinæ might perhaps be considered as having a similar distribution; the Ropalidiinæ extend over the Ethiopian, Oriental, and Australian regions; the Vespinæ range throughout the Palearctic, Nearctic, and Oriental regions; the Euparagiinæ are Nearctic, Neotropical, and Australian; and the Stenogastrinæ are endemic in the Oriental and Australian regions.

Handlirsch[4] has shown that the Neotropical region, owing to its large proportion of endemic insect genera, is the richest and best characterized of the zoögeographic main divisions of the world. This is especially true for the diplopterous wasps, which present there a very large number of species and an extraordinary variety of form and habits. About one-half (40) of the described genera occur there and a large proportion of these (27) are endemic types. The numerous social species of Epiponinæ are one of the most noticeable features of the South and Central American wasp fauna.

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[1] Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Heft 3, 1913, Abt. 1, pp. 372–373.

[2] H. Friese, Fauna arctica, II, 3, 1903, p. 479.

[3] T. Kincaid, Proc. Washington Ac. Sc., II, 1900, p. 510.

[4] Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, 3, 1913, Abt. 1, p. 413.

This subfamily is almost exclusively tropical. It is exceptionally abundant in the Neotropical region, offering there 19 genera, all of which are practically endemic. These social wasps do not go south of the Rio Negro in Argentina; nor are they found on the Chilean slopes of the Andes. In the Northern hemisphere, only two species, belonging to the genus *Mischocyttarus*, have crossed into the subtropical parts of the United States. Only three genera of Epiponinæ are found in the Old World tropics; one of them, *Parapolybia*, is exclusively Oriental; another, *Belonogaster*, is practically restricted to the Ethiopian region; the third, *Polybioides*, is equally distributed over both these regions. Negative features of the Neotropical region are the absence of the Stenogastrinæ, Ropalidiinæ, and Vespinæ.

Apart from a few sporadic representatives of Neotropical genera, such as *Mischocyttarus*, *Zethus*, *Pachymenes*, and *Monobia*, the wasp fauna of the Nearctic region shows few striking features. Thirteen genera are represented there, and among them only three, belonging to the Euparagiinæ and Masarinæ, are endemic. Though its affinities are chiefly with the Palearctic region, most of its genera are practically cosmopolitan. I do not know of a single genus of Vespidæ with a strictly Holarctic distribution, being found only in the Nearctic and Palearctic regions.

As might be expected, the Palearctic region has been thoroughly investigated. Yet its wasp fauna as a whole is not much richer than that of the Nearctic region. Of the sixteen genera found there, only one, *Psiliglossa*, is endemic; several of the others are cosmopolites (*Odynerus*, *Eumenes*, *Polistes*) or distributed over two or more regions. The absence from the Palearctic region of some types with a very wide range, such as *Zethus*, and of some true Old World forms, such as *Labus* and *Ropalidia*, is noteworthy.

In this sketch of the wasp faunæ of the different parts of the world, I shall treat the Australian and Oriental regions together, because the limits between them have not yet been definitely settled. However, this method does not allow of a very clear understanding of the faunal relationships. Considering the comparatively small extension of the Australian and Oriental regions, which is about that of the Nearctic region, their wasp fauna is remarkably rich. Thirty-five genera have been found in these regions; eighteen are endemic, but many of them (nine genera, with 142 species) are restricted to the Australian continent. The high number of species is chiefly made up by a few genera of rather wide distribution: *Odynerus*, *Eumenes*, *Ropalidia*, *Polistes*, and *Vespa*. The range of *Vespa* is noteworthy because no other genus of Vespidæ has a similar distribution: it is restricted to the Palearctic, Nearctic, and Oriental regions and extends also over New Guinea, Southern Arabia and Egypt. *Provespa* is a closely allied type, adapted to nocturnal habits and restricted to the Oriental region. A truly Oriental type is *Stenogaster*, the only genus of the Stenogastrinæ; some of its species are found in New Guinea, but it has never been recorded from Australia proper. Apparently no diplopterous wasps have been found in New Zealand.[1] This is the more extraordinary since the Hawaiian Islands possess 119 species of Vespidæ belonging to three genera: *Polistes* (2), *Odynerus* (114), and *Pterochilus* (3). The genus *Ropalidia* is remarkable for being very rich in species and restricted to the tropical part of the Old World. However, in some other genera there are species with a similar distribution, as I shall have an opportunity to point out farther on. In many ways, the Oriental region is intermediate between the Ethiopian and Australian regions.

The Ethiopian region is much poorer in diplopterous wasps than any of the other tropical parts of the world; this is especially striking if we note its large extension, its size being about twice that of either the Neotropical or Oriental regions. The total number of species and genera is much inferior to that of the Neotropical region and hardly equal to that of the Oriental. Only 29 genera have been recorded from the Ethiopian region and some of them, such as *Vespa*, *Elimus*, etc., are still of very doubtful occurrence. Seven of its genera are practically endemic: *Masariella*, *Paramischocyttarus*, *Ischnogasteroides*, *Pseudochilus*, *Synagris*, *Rhynchalastor*, and *Belonogaster;* a single species of *Belonogaster* reaches western India. The three best defined of these endemic types are *Paramischocyttarus*, *Synagris*, and *Belonogaster;* especially the two last named genera have numerous species, which are common and of large size; and they are, therefore, in no slight degree one of the characteristic features of the African fauna. A large number of Ethiopian genera are cosmopolitan or at least known also from the Palearctic region. *Zethus* is its only tropicopolitan type and is very poorly represented. The truly tropical genera of Africa do not show any affinities with the Neotropical region. Their nearest relatives are found in the Oriental region, a fact plainly shown by the distribution of such types as *Labus*, *Pareumenes*, *Polybioides*, and *Ropalidia* (Fig. 240). The numerous relations between the Oriental and Ethiopian faunæ are further indicated by the range of some of the more common species of *Eumenes* [*E. maxillosus* (de Geer), Fig. 44; *E. caffer* (Linné), Fig. 56] and *Odynerus* [*O. hæmorrhoidalis* (Fabricius), p. 145]. This, I believe, will become more evident still as the true relationships of the numerous forms of these two genera are more thoroughly studied. However, the Oriental region possesses several types, such as *Stenogaster*, *Parapolybia*, *Vespa*, and *Provespa*, which do not occur in Africa. The many peculiar forms of the Australian continent find no allies among the Ethiopian wasps.

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[1] The hymenopterous fauna of New Zealand as a whole is very poor.

So far as the distribution of the Vespidæ is concerned, there are no marked differences between the various subdivisions of the Ethiopian region. The Malagasy subregion is perhaps the best characterized, because *Synagris*, the most truly Ethiopian wasp type, is entirely absent there; it lacks also the Masarinæ, *Raphiglossa, Paramischocyttarus,* and *Polybioides.* Though it possesses no wasp genus of its own, it is exceptionally rich in species of *Belonogaster* and *Ropalidia,* some of which have a peculiar leaf-green color found nowhere else throughout the range of these genera. Some Oriental types, such as *Polistes macaensis* (Fabricius) and *Odynerus trilobus* (Fabricius), have reached Madagascar and the Seychelles, and perhaps are now settling on the east coast of Africa.

There is, among the Vespidæ, apparently no strictly Guinean or West African genus, although the range of many species or varieties coincides fairly well with that of Engler's Western Forest province, as I shall often have an opportunity of showing in the course of this paper. In Engler's Savannah province, the genus *Raphiglossa* (Fig. 1) extends over South and East Africa; several species of *Belonogaster* and *Synagris* have a similar distribution, or range even across the Sudan as far as Senegambia. The majority of the Ethiopian Masarinæ are found only south of the Orange River; however, they are not restricted to Engler's Southwestern Cape region, but occur throughout the central Karroo and even in Damaraland. It is worth mentioning that the strictly Ethiopian genera *Paramischocyttarus* (Fig. 6), *Synagris* (Fig. 226), and *Belonogaster* (Fig. 237) are absent from the southwestern part of the Cape Colony.

KEY TO THE GENERA OF VESPIDÆ, EXCEPT THE MASARINÆ, KNOWN TO OCCUR IN THE ETHIOPIAN REGION[1]

1. Second and third cubital cells each receiving one of the recurrent nervures. Tarsal claws toothed; middle tibiæ with one apical spur. Mandibles short, 4-dentate. Antennæ ♀ 12-, ♂ 13-jointed, the terminal joint of the ♂ antennæ normal, not hook-like. Labium very long, protractile. Abdomen with the first segment very long and slender, petioliform.
Raphiglossa S. Saunders.
Second cubital cell receiving both recurrent nervures......................2.

2. Tarsal claws toothed beneath or bifid near the apex; in some cases nearly simple, the middle tibiæ then with one apical spur. Middle tibiæ with one or two apical spurs. Solitary species, with ♀♀ and ♂♂ only................3.

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[1] The African Masarinæ can be recognized at once by their front wings, which have only two closed cubital cells; all the other African genera of diplopterous wasps have three closed cubital cells. The generic characters used in the present key will prove entirely correct for the known African species only, although in most cases they may be true also for species from other regions.

Tarsal claws simple, edentate. Mandibles short, not grooved at their outer surface. Middle tibiæ with two apical spurs. Social species, several ♀♀ living together and sometimes with a worker caste....................17.

3. Mandibles short, obliquely truncate at the apex, folded under the anterior part of the clypeus so as to cover partly each other. Middle tibiæ with one or two apical spurs. First abdominal segment always much narrowed, petioliform..4.

Mandibles more or less elongate, beak-like or crossing each other in an X, always distinctly produced beneath the inferior margin of the clypeus. Middle tibiæ with one apical spur..8.

4. First abdominal segment very narrow and elongate, as is also the basal half of the second segment; the petiole thus produced is very slender and twice as long as head and thorax together. Antennæ 12-jointed ♀, 13-jointed ♂, the terminal three joints of the ♂ antennæ spirally rolled up. Middle tibiæ with two apical spurs......................*Paramischocyttarus* Magretti. (*Ischnogasteroides* Magretti, which I have not seen, seems to come near this genus).

Abdominal petiole much shorter and not exceedingly slender, the second segment only narrowed over a short distance near its base, the total length of the petiole scarcely exceeding that of head and thorax. Terminal joint of ♂ antennæ (so far as known in the African species) recurved, hook-like.............5.

5. First abdominal segment very narrow, forming a long and slender petiole, which is only slightly broadened posteriorly and is flattened or uniformly rounded on its dorsal face; second abdominal segment subsessile, scarcely necked. Second cubital cell triangular, strongly narrowed or more or less petiolate on the radius...*Labus* Saussure.

Abdominal petiole differently shaped, the first abdominal segment swollen laterally or above in the middle, or the second segment with a distinctly narrowed basal neck..6.

6. Basal quarter or fifth of the second abdominal segment narrowed into a neck. First abdominal segment much elongate, gradually swollen towards its middle, fusiform. Second cubital cell trapeziform, broadly open on the radius. *Zethus* Fabricius.

Second abdominal segment scarcely or not narrowed into a neck at the base..7.

7. Abdominal petiole (first segment) long, depressed, gradually broadening from its base toward its apex, much as in *Eumenes*..........*Pareumenes* Saussure.

Abdominal petiole (first segment) narrow and slender at its base, strongly and abruptly swollen in its posterior half, club-shaped.......*Elimus* Saussure. (The occurrence of this genus in Africa is doubtful).

8. Clypeus ending anteriorly in a distinctly pointed apex. Labial palpi 4-jointed, the terminal joint very small; maxillary palpi 6-jointed. Second cubital cell much narrowed or subpetiolate on the radius. Abdomen *Odynerus*-like, not narrowed into a petiole..................*Rhynchalastor* Meade Waldo.

Clypeus truncate or emarginate at its apex............................9.

9. First abdominal segment narrowed into a more or less elongate petiole, its apex at most half the width of the second segment. Labial palpi 4-jointed; maxillary palpi 6-jointed...10.

First abdominal segment not at all petiole-shaped, not or scarcely narrower than the second segment. As an exception, slightly petiolate at its base in *Montezumia;* in which case, the labial palpi are 3-jointed and the maxillary palpi 5-jointed .... 12.

10. First abdominal tergite (petiole) with a transverse carina near its base, as in *Ancistrocerus*, funnel-shaped or subcampanulate, never very long and narrow. *Nortonia* Saussure.
Abdominal petiole without transverse carina on its dorsal face .... 11.

11. First abdominal segment funnel-shaped or subcampanulate, with a very narrow short basal part and a much longer swollen terminal portion. The first segment never longer than the second, as a rule much shorter, a condition intermediate between *Eumenes* and *Odynerus* ...... *Pachymenes* Saussure.[1]
First abdominal segment distinctly elongated into a petiole, which is as a rule very narrow and as long as or longer than the thorax or the second abdominal segment .... *Eumenes* Latreille.

12. Second cubital cell distinctly petiolate. First abdominal segment without transverse suture. Terminal joint of ♂ antennæ hook-like. Scarcely different from *Odynerus* .... *Alastor* Lepeletier.
Second cubital cell not petiolate, broadly open, narrowed, or closed on the radius .... 13.

13. Maxillary palpi 5-jointed (often one or more of the terminal joints dropped off)[2]; labial palpi 3-jointed .... 14.
Maxillary palpi 6-jointed; labial palpi 4-jointed, the basal joints heavy, the fourth joint often minute and scarcely visible .... 15.

14. First abdominal segment funnel-shaped with a short narrow petiole at its base, very much as in *Pachymenes* from which this genus can only be separated on account of the palpi. Lateral angles of propodeum not projecting into heavy spines[3] .... *Montezumia* Saussure.
Abdomen not at all narrowed into a petiole at its base. Large wasps. The lateral angles of the propodeum, as a rule, projecting into heavy strong spines. Joints of the labial palpi very long and slender; the fourth joint replaced by a long bristle[2] .... *Synagris* Latreille.

15. Labial palpi long; their joints flattened and ciliated with long hairs at their inner side in the ♀; in the ♂ feebly or not ciliated ...... *Pterochilus* Klug.
Labial palpi normal in both ♀ and ♂, neither flattened nor ciliated .... 16.

16. First abdominal tergite with at least one distinct transverse carina or suture near its base or on its middle, sometimes with two carinæ. Last joint of antennæ in the ♂ folded back to form a hook .... *Ancistrocerus* Wesmael.
First abdominal tergite without transverse carina or suture. Terminal joints of the ♂ antennæ rolled up in spiral fashion or the last joint hook-like. *Odynerus* Latreille.

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[1] *Pseudochilus* Saussure, with the single species *P. glabripalpis* (Saussure), comes apparently very close to *Pachymenes*. I have not seen that insect.

[2] In *Synagris vicaria* Stadelmann, the maxillary palpi are distinctly 6-jointed; the labial palpi, however, possess only three joints.

[3] I have not seen African species of this genus.

17. Clypeus broadly truncate at the apex, which is often slightly sinuate in the middle and presents more or less projecting lateral edges. First tergite without narrowed petiole, vertically truncate at its base, its anterior sloping part forming a strong angle with its posterior portion. Hind wings without anal lobe. Antennæ, ♀, 12-jointed; ♂, 13-jointed; the terminal joints in the ♂ always simple. Maxillary palpi 6-jointed; labial palpi 4-jointed. *Vespa* Linné.

Clypeus tapering anteriorly to a sharply or bluntly pointed apex, or broadly rounded, rarely broadly truncate over its whole width (in certain *Polistes* ♂♂). First tergite always distinctly rounded above, often with a narrowed petiole-shaped base. Hind wings with an anal lobe....................18.

18. Abdomen with its second segment much enlarged; the tergite and sternite of this segment nearly completely fused into a bell which includes the greater part of the posterior retracted segments. First segment much narrower than the second, more or less petiolate and narrowed at its base, swollen in its apical portion. Extensory muscle of the abdomen fixed on the propodeum in a narrowly compressed valvula. Antennæ and palpi much as in *Polistes*..*Ropalidia* Guérin.

Tergite and sternite of the second segment distinctly free from each other..19.

19. Extensory muscle of the abdomen inserted on the propodeum in a narrow and much compressed valvula between the apical scales of the propodeum. First segment shortly, or not at all, petiolate at its base. Antennæ 12-jointed, ♀; 13-jointed, ♂; the terminal joints in the ♂ simple or more or less spirally rolled up. Maxillary palpi 6-jointed; labial palpi 4-jointed. *Polistes* Latreille.

Extensory muscle of the abdomen inserted on the propodeum in a broad and oval valvula between the apical scales of the propodeum, the opening of which is always rounded above. First segment distinctly narrowed into a petiole, at least at its base. Antennæ 11-jointed in the ♀, 12-jointed in the ♂. Maxillary palpi 5-jointed; labial palpi 3-jointed..............20.

20. Abdominal petiole very long and slender, including the whole of the much narrowed first segment and the basal portion of the second. Mesopleura without sutures subdividing the episterna or separating the epimera. Terminal joints of antennæ in the ♂ rolled up spirally. Large species, always over 15 mm. in total length.......................*Belonogaster* Saussure.

Abdominal petiole comparatively short, gradually widening towards its posterior half; second segment only short-necked, not forming a part of the petiole. Mesopleural suture and median episternal groove distinctly marked on the mesopleura. Terminal joints of the antennæ in the ♂ simple. Small species, never attaining 15 mm. in total length....*Polybioides* R. du Buysson.

DESCRIPTIVE ACCOUNT OF THE VESPIDÆ OF THE BELGIAN CONGO

RAPHIGLOSSINÆ

Raphiglossa S. Saunders

Four species have been recorded from the Ethiopian part of Africa; but some of them are apparently very closely related, if not identical. They are restricted to the savannah and steppe regions and are always scarce. Fig. 1 shows the distribution of the genus so far as known.

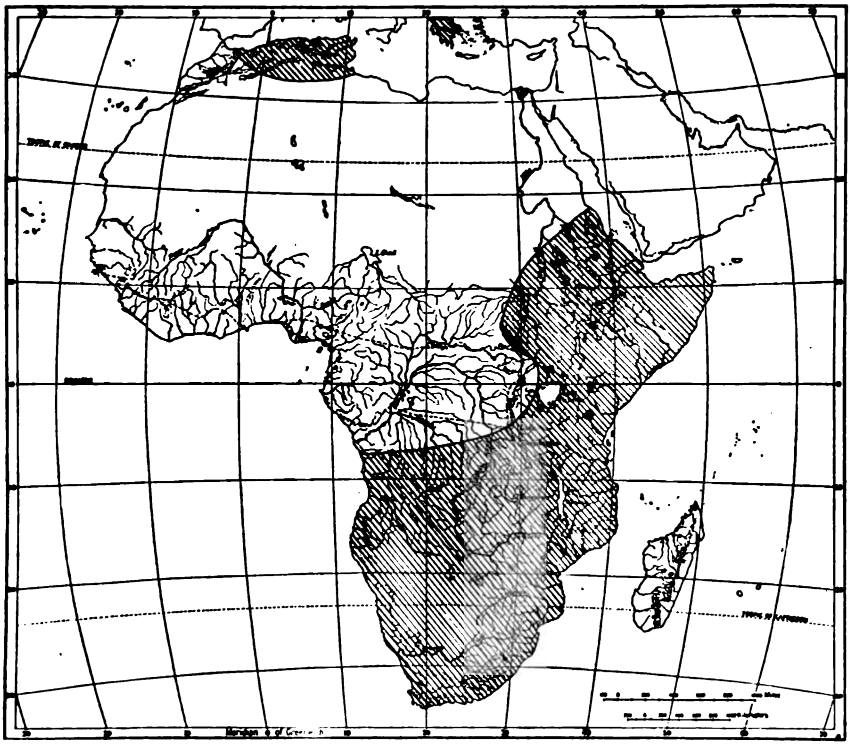

Fig. 1. Distribution of the genus *Raphiglossa.*

Ethology. *R. flavo-ornata* P. Cameron was bred in South Africa by

H. Brauns.[1] It excavates its cells in dry stems which have soft pulp, chiefly Liliaceæ, and makes simple partitions, provisioning its larvæ with small caterpillars; each imago escapes from the cell through the wall. In the Mediterranean subregion *R. eumenoides* Saunders nests in briars,[2] and *R. zethoides* Saussure in reeds[3]; both fill their cells with small beetle larvæ (Curculionidæ); in order to escape, the perfect insect gnaws a circular aperture through the side of the briar or reed.

1. **Raphiglossa flavo-ornata** P. Cameron

Belgian Congo.— A single female of this very interesting wasp was collected by Messrs. Lang and Chapin at Faradje, Uele, December 1912. This capture extends the range of the species far northward; it was previously known from the Cape Colony, Angola, North East Rhodesia, and Katanga; I collected several specimens of it in the last named region.

The Uele specimen agrees with the description given by Meade Waldo and also with a South African specimen sent by Dr. H. Brauns. However, the structural characters of *R. flavo-ornata* Cameron ought to be compared with those of some Mediterranean forms, especially with those of *R. symmorpha* Saussure, a species which has been recorded from Abyssinia.

ZETHINÆ

Zethus Fabricius

The following species, the first of the genus to be recorded from Equatorial Africa, is simply referred to *Zethus* Fabricius in its broader sense, as accepted by E. Zavattari in his latest papers on the South American solitary wasps.[4] The genus includes, besides *Zethus* Fabricius *sensu stricto*, the divisions or subgenera *Zethusculus* Saussure, *Didymogastra* Perty, *Heros* Saussure, *Calligaster* Saussure, *Wettsteinia* Dalla Torre, and *Laboides* Zavattari. Notwithstanding the occurrence of intermediate species, it may prove useful to retain some of these divisions as genera, since they undoubtedly form natural groups. However, this cannot be attempted at the present time, because none of these groups have been thoroughly characterized. It is, indeed, very difficult to decide in which of these sections the African species must be placed.

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[1] G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 45.

[2] S. S. Saunders, Trans. Ent. Soc. London, (2), I, 3, 1850, pp. 72-74; idem, 1873, pp. 407-410.

[3] Ferton, Ann. Soc. ent. France, LXXX, (1911), 3, 1912, pp. 383-387.

[4] Arch. f. Naturgesch., LXXVIII, Abt. A, Heft 4, 1912, p. 8.

A. v. Schulthess refers his *Z. delagoensis* to the subgenus *Calligaster*. This group was originally described as a genus by H. de Saussure[1] and included the two species, *C. cyanoptera* Saussure and *C. hero* Saussure; both were later on brought in *Zethus*, although in different divisions: *Zethus cyanopterus* Saussure in the division *Calligaster*, and *Zethus gigas* Spinola (= *Calligaster hero* Saussure) in the division *Heros* Saussure.[2] Neither of these two species seems to be closely related to the African *Zethus*. In both of them the second abdominal segment is only very short-necked at the base, and the shape of the abdominal petiole, too, is distinctly different. I believe that, owing to the short, but nevertheless well defined, neck of the second abdominal segment and to the regularly fusiform petiole, the African *Z. delagoensis* A. v. Schulthess and *Z. rodhaini* may best be compared with the American *Zethusculus* (type: *Zethus jurinei* Saussure), though it seems hazardous to include them definitely in that group. In some of the American *Zethusculus* the antennæ are spirally rolled up at the apex, whereas in others they end in a hook-like joint. In the male of *Z. delagoensis* the terminal joint of the flagellum is hook-like and folded underneath the preceding joints; the two African species have two terminal spurs on the middle tibiæ, whereas, according to Zavattari, this number is variable among the American *Zethusculus*.

Ethology. Although the species of *Zethus* in the broad sense are, so far as known, solitary wasps, the study of their habits is one of the most interesting chapters of insect ethology, because some of them are apparently in actual evolution toward the conditions of social life.

Ashmead[3] records that he has frequently taken the mud cells of *Zethus spinipes* Say from the twigs of the Iron Tree in Florida. But I could not discover any other record of the habits of this North American species.

The nest of the South American *Zethus* (*Didymogastra*) *romandinus* (Saussure) was described and figured by H. de Saussure[4]: it forms a lump in which several rounded cells of a black color are irregularly united, the form of each cell recalling slightly that of *Bombus;* the walls, thickened toward the bottom, are made of a mixture of wood fibre and a gummy material. H. O. Forbes[5] figures the very remarkable nest of *Calligaster cyanoptera* Saussure, from Java and writes with regard to it: "A colony of these bees had covered the stems of a species of Asclepias, overgrowing the face of a high cliff; and it took a sharp eye to distinguish their nests from clusters of the weathered leaves of the climber. Composed of chips of leaves glued together, they were protected from the rain by a projecting roof, which for the purpose of concealment was cunningly shaped like the foliage of the plant itself. There was quite a crowd of them." This seems to indicate the existence of communistic instincts in this species.

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[1] Et. fam. Vesp., I, Eum., 1852, p. 22.

[2] Et. fam. Vesp., III, Suppl., 1854, p. 115.

[3] Psyche, VII, 1894, p. 77.

[4] Et. fam. Vesp., I, Eum., 1852, p. 20; Pl. IX, fig. 1c. Smithsonian Miscell. Coll., XIV, No. 254, 1875, p. 47.

[5] A Naturalist's Wanderings in the Eastern Archipelago, 1885, p. 73.

Much more complete are the observations of A. Ducke[1] on some Brazilian species. According to this excellent student of tropical wasps, the female of the large-sized *Zethus mexicanus* (Linné) nests singly after the usual manner of other solitary wasps, using holes in dry wood; the substance of the partitions is green and made of malaxated pieces of leaves. Apparently in all the smaller species of the subgenera *Zethusculus* and *Didymogastra*, however, several fertile females work together on the same nest. The nest of *Zethusculus lobulatus* (Saussure) consists of nearly cylindrical cells fixed on a vine and opening on either of two opposite sides. The walls are made of pieces of leaves, which are irregularly circular, 1 to 1.5 mm. in diameter, and apparently strongly worked all over with the mandibles; they are pasted together with a resinous substance. The freshly made cells are green and soft, but after a few days they turn dark brown and become very hard. As soon as the cell is half completed, the mother wasp lays an egg in the bottom and then continues to build the walls of the cell. About the time these are finished, the egg hatches and the mother wasp then feeds the larva, from day to day, with small paralyzed caterpillars, bringing in larger ones as the larva increases in size. The cell is closed by the mother, above the full-grown larva, with the same mixture of pieces of malaxated leaves and resin, but the resin is predominant. Such a nest is nearly always constructed by several fertile females, as many as a dozen, but this association is evidently nothing more than a colony. Ducke once observed how two females started their nests at a short distance from each other; through further addition of cells the two nests became fused into a single one. Both females and males are found on the larger nests, and a part at least of the newly emerged females remain true to their old nest and add supplementary cells to it. At night or during the rain, the building female sits in the open cell, with the egg or larva; the male hides in a similar manner in some old, empty cell. *Didymogastra geniculata* (Spinola) builds oval, transversely striate cells very similar to those figured by H. de Saussure for *D. romandina;* the very hard walls are probably of the same material as those of *Z. lobulatus.* Similar nests are also built by a fourth species. The use of vegetable fibre in building the nest, the nursing of the larva from day to day, and the gathering of several females on a single construction are so many interesting ethological facts, evidently showing an evolution towards social habits. However, it must be noted that, even in these cases, each of the females cares only for its own offspring.

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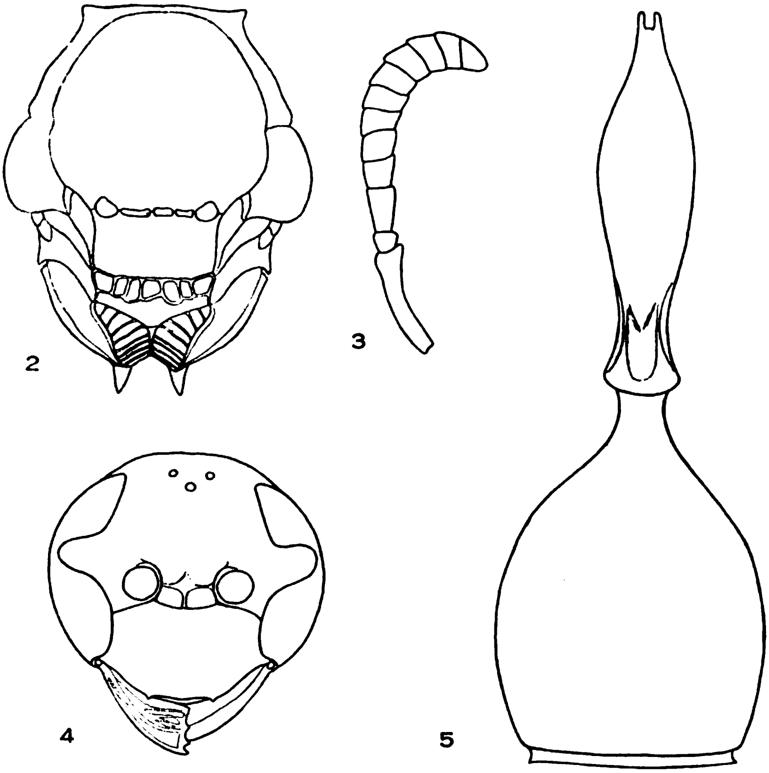
[1] Zool. Jahrb. Abt. f. Syst., XXXVI, 1914, pp. 308, 320, and 325–326, fig. R.

Nothing is known with regard to the habits of any of the African species.

2. **Zethus rodhaini**, new species

Plate I, Figure 5

♀.— Head subcircular (Fig. 4); slightly broader than high. Clypeus transverse; one and a half times as broad as high; its anterior margin broadly truncate; its apex measures about one third of the total width of the clypeus and terminates on each side in a short projecting edge; these projecting edges are united through a



Figs. 2–5. *Zethus rodhaini*, new species.

Fig. 2. Thorax from above, ♀. Fig. 3. Antenna, ♀. Fig. 4. Head in front, ♀. Fig. 5. First and second tergites from above, ♀.

narrow depressed margin. Mandibles broad and short; of the *Zethus* type; their apices broadly truncate, with four rounded teeth, covering each other on the middle line; their outer surface with a strong continuous longitudinal, median ridge, and a number of irregular grooves. Maxillary palpi 6-jointed, their three terminal joints long and slender; labial palpi distinctly 4-jointed, their fourth joint very short but well developed. Front between the insertion of the antennæ with a distinct transverse ridge; below this, two deep and broad grooves separated by a median frontal carina; antennal pits margined on their inner half by a strong erected crest. Vertex well developed, distinctly margined behind, without fovea; posterior ocelli slightly farther from the inner margin of the eyes than from each other, distinctly farther from the hind margin of the vertex. Temples very broad, as wide as the eyes seen in profile, strongly and sharply margined, obliquely truncate at their lower end; at the edge between its vertical and horizontal part, the raised margin is produced in a strong tooth. Antennæ (Fig. 3) short and thick; the flagellum very strongly swollen; the third antennal joint one and one-half times the length of the fourth; most of the following joints much broader than long and distinctly shortened towards the under side.

Thorax (Fig. 2) heavily built, somewhat flattened dorsally. Pronotum with a sharp, although not carinate, anterior margin; with distinctly projecting lateral angles which continue on the sides, towards the base of the front legs, as strongly raised carinæ. A small number of broad excavations on the suture between mesonotum and scutellum. Scutellum broad, transverse. Postscutellum with an irregular, transverse ridge separating the narrow anterior face from the longer, oblique posterior face; sides of the postscutellum with a raised carina. Propodeum short, with a shallow, broad, strongly transversely striate, median depression; its sides moderately swollen, with two very strong longitudinal carinæ. The dorsal area between the carinæ rugose-reticulate; the lateral area beneath the external carina transversely striate. The apical spines, above the valvula of the abdomen, very heavy and sharp. Mesopleura with a raised anterior carina delimiting the epicnemia of the front legs. Legs heavy; the femora moderately swollen. Tibiæ with a row of 8 to 10 strong spines on their outer face. The middle tibiæ with two apical spurs.

Abdomen (Fig. 5) elongate and slender; of typical *Zethus* shape. The first segment very narrow and elongate, slightly longer than the thorax, about as long as the second segment. This first petiole-shaped segment is much narrowed and gradually depressed towards its base; its median part is gradually swollen, fusiform, nearly as thick as broad. The widest part of the petiole is situated in front of its middle, since it is distinctly constricted before its slightly expanding apex. This constricted apical part is depressed on the sides and above, the median depression being margined by two rounded longitudinal ridges. Second abdominal segment bell-shaped, with a distinct, but moderately long, basal neck; this petiolate base scarcely longer than the apex of the first segment. Apical margin of the second segment distinctly duplicate, the terminal lamella slightly curved upward at its end.

Punctation dense and coarse on head, including clypeus, thorax, and two basal abdominal segments. The third to sixth abdominal segments impunctate. Pubescence rather scarce, short and grayish.

Entirely black, without any yellow markings; only the flagellum beneath is slightly ferruginous. Wings feebly infuscate.

Length (h. + th. + t. 1 + 2), 14 mm.

♂ unknown.

Belgian Congo.— One female from Walikale, January 10, 1915, in the eastern Congo forest (J. Bequaert Coll.).

This species is evidently related to *Zethus delagoensis* A. v. Schulthess (= *Discœlius transvaalensis* Bingham), coming in the same subgenus. It is, however, easily recognized by the different shape and sculpture of the postscutellum and propodeum. In *Z. delagoensis*, of which I have been able to study one male and two females from Delagoa Bay, the postscutellum is flattened and oblique, with feeble punctures; the propodeum has no longitudinal carinæ, but its sides are broadly rounded; also, this species presents much richer ferruginous markings.

Paramischocyttarus Magretti

Magretti has placed this genus near *Mischocyttarus* Saussure, and Meade Waldo compares it with *Stenogaster* Guérin. Ashmead locates it in his social wasps or Vespidæ, next to *Mischocyttarus* Saussure.[1] However, observations, which I made a few years ago in the Katanga, show that the habits of *Paramischocyttarus* are those of a true solitary wasp and this leads us to review, on its morphological features, the real affinities of the genus. The following are its most important characters:

Clypeus transverse, emarginate at the apex, ending in two small lateral teeth. Mandibles short, grooved on the outer side, obliquely truncate and tridentate at the apex in the male, quadridentate in the female. Antennæ 12-jointed in the female, 13-jointed in the male; in the latter sex the three terminal joints are flattened and spirally rolled up. Middle tibiæ with two distinct, strong, terminal spurs. Claws of the tarsi bifid at the apex.

The mouth parts (Figs. 8 and 9) are very similar to those of *Zethus* [2] and *Elimus* [3]; they are comparatively elongate and extensible. Mentum short and broad; ligula elongate, shortly bifid at the apex, slightly hairy on the middle part; paraglossæ long and slender, scarcely thickened at their apex. Labial palpi elongate, 4-jointed; their basal joint very long, strongly curved, slender at its base, thickened at its apex; second joint short and thick; the third and fourth elongate and narrow, both very distinct. Maxillæ elongate; the lacinia longer than the stipes. Maxillary palpi 6-jointed; elongate; their first joint thickened; their first and second almost of equal length; their third much longer and narrow; their three terminal joints very distinct, almost of equal length, long and slender.

The shape of the abdomen is very peculiar and striking; however, it is only an exaggeration of what is seen in *Zethus*, a genus to which *Paramischo-*

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[1] Canadian Entom., XXXIV, 1902, p. 166. Curiously enough Ashmead makes, with *Stenogaster* Guérin and *Ischnogasteroides* Magretti, the subfamily Ischnogasterinæ, which he places in his solitary Eumenidæ (*op. cit.*, pp. 204–205).

[2] H. de Saussure, Et. fam. Vesp., I, Eum., 1852, Pl. II, fig. 3.

[3] Saussure, idem, Pl. III, fig. 1.

cyttarus is in my opinion so closely related that certain neotropical species of the subgenus *Didymogastra* Perty can hardly be separated from it. The abdominal petiole consists of the whole of the first and the basal half of the second segment; it is much longer than head and thorax together, very narrow and slender.

Stenogaster Guérin differs, *inter alia*, in the structure of the thorax and the elongated, beak-like mandibles, which are smooth on the outer side. The clypeus is narrowed and ends in a strongly pointed apex. The antennæ of the male have their terminal joint recurved so as to form a hook. The wing venation is very peculiar and built on a plan very different from that of other diplopterous wasps. *Mischocyttarus* Saussure is, if possible, still more dissimilar, not only in the general shape of the body, which reminds one of *Belonogaster* Saussure, but also in the following important features: clypeus pointed at the apex; antennæ of the male simple, their terminal joint normal, conical; middle and hind legs with the third and fourth joints of the tarsi elongate, lobate at their inner side; tarsal claws simple, edentate. The wing venation also appears to present many differences.

The genus *Ischnogasteroides* Magretti is undoubtedly closely related to *Paramischocyttarus*, and I was even inclined to unite it with the latter. However, only the female is known and, since I have seen no specimens of it, I must leave the question unsettled. According to the published description, the clypeus is convex, prolonged anteriorly, and arcuate so as to end in two sharp, divergent teeth. The tarsal claws are bifid.[1] The wing venation is similar to that of *Paramischocyttarus* and the shape of the abdomen is somewhat intermediate between that of this genus and of *Zethus*. The chief differences seem to lie in the presence of only one terminal spur on the middle tibiæ[1] and in the shape of the mandibles which are described as narrow and long, beak-like. The habits of *Ischnogasteroides* are unknown.

Paramischocyttarus is restricted to the Ethiopian region, its distribution so far as known being shown in Fig. 6. Three species have been described, but I believe later observations will prove that they are synonymous. All the specimens I have seen from the Belgian Congo belong to one species, and they agree best with the very short description of *P. buyssoni* Gribodo. From this, *P. lacuum* Stadelmann differs chiefly in the tegulæ being "strohgelb," whereas in *P. buyssoni* they are "rufo-ferrugineæ." In both these species the hind femora are rather normal, whereas in *P. subtilis* Magretti (= *Tanyzethus africanus* Cameron) they are, according to the figure,[2] somewhat clavate; in *P. subtilis,* also, the tegulæ and two spots on the scutellum are described as "flavostramineæ."

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[1] The shape of the tarsal claws and the number of tibial spurs were fixed on the type specimen by Magretti, according to G. Meade Waldo, Ann. Mag. Nat. Hist., (8) XI, 1913, p. 54.

[2] Ann. Mus. civ. Genova, XXI, 1884, p. 602.

Ethology. Since nothing is recorded on the habits of *Paramischocyttarus,* I might mention a few observations made some years ago on a wasp of this genus which cannot be identified at present, the specimens not being available. However, it is probable that the species in question was *P. buyssoni* Gribodo.

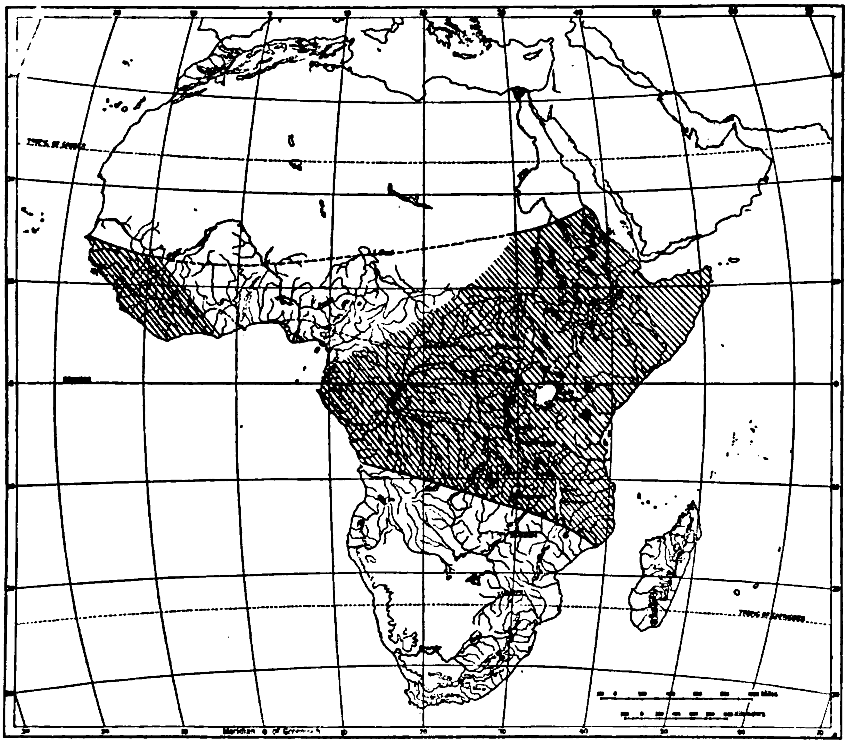


Fig. 6. Distribution of the genus *Paramischocyttarus.*

The nest of this wasp was found, at Bukama (Katanga, southeastern Belgian Congo, July 1911), in the hollow pith channel of a dry stick in the thatched roof of a house. The female apparently did not excavate the pith herself, nor did she remove the remains of pith along the walls. She built a transverse partition of clay at about 10 cm. from the entrance. The first cell in front of this clay partition was the only complete one of the nest;

it was about 10 mm. long, the pith channel having a diameter of 4.5 mm., and was filled with a large number of small spiders belonging to different species. The spiders were not dead but merely paralyzed. The egg which was found in this cell was cylindrical, elongate, and rounded at both apices; it was not fixed by a thread to the roof of the cell, as is usual among solitary diplopterous wasps, but simply attached to the body of one of the spiders. This first cell was closed by another transverse mud wall, which was convex and rugose behind, concave and smooth on its anterior face. In front of this second mud wall, the mother wasp had stored a number of spiders, but she had not yet closed the cell itself.

3. **Paramischocyttarus buyssoni** Gribodo

Plate I, Figure 1

The published descriptions and drawings of *Paramischocyttarus* are all very incomplete; accordingly it has been thought advisable to redescribe the Congo species in detail in order to facilitate its exact identification in the future.

♀.— Head (Fig. 12) almost subcircular in front; very large; as seen from above, considerably broader than the thorax. Clypeus very broad, about one and one-half times as wide as long on the middle line; its broad apical margin feebly but distinctly emarginate, with strongly projecting, acute lateral angles; its surface feebly convex, without carinæ but with a transverse, well-defined, short depression before its apex; this depression often with a median tubercle which projects slightly as an obsolete tooth in the middle of the apical emargination of the clypeus. Oculo-malar spaces very narrow. Front distinctly swollen between the insertion of the antennæ, but without carina or ridge. Vertex also swollen, very elongate, without fovea; the posterior ocelli about as far from the inner margin of the eyes as from each other, twice as far from the hind margin of the vertex. Temples moderately swollen, not projecting beyond the eyes on the head as seen from above; seen in profile, they are very broad in their upper part, very narrow in their inferior half, the transition being sudden and producing a sharp posterior angle. Temples and vertex margined behind by a very sharp and high carina. Mandibles very broad and short; their apex broadly truncate with four strong triangular teeth almost of equal size. The mandibles are folded above each other underneath the clypeus, so as to be almost completely hidden from sight when closed. Antennæ short and heavily built; the flagellum moderately swollen; the third antennal joint nearly as long as the fourth and fifth together; joints 4 to 11 broader than long; the apical joint much longer than broad.

Thorax elongate and narrow. Pronotum long; only slightly narrowed towards its anterior margin, which is broadly truncate and raised into a short, sharp carina; its lateral angles rounded, scarcely projecting. Mesonotum distinctly longer than broad, with two feeble and very short traces of parapsidal furrows in front of the

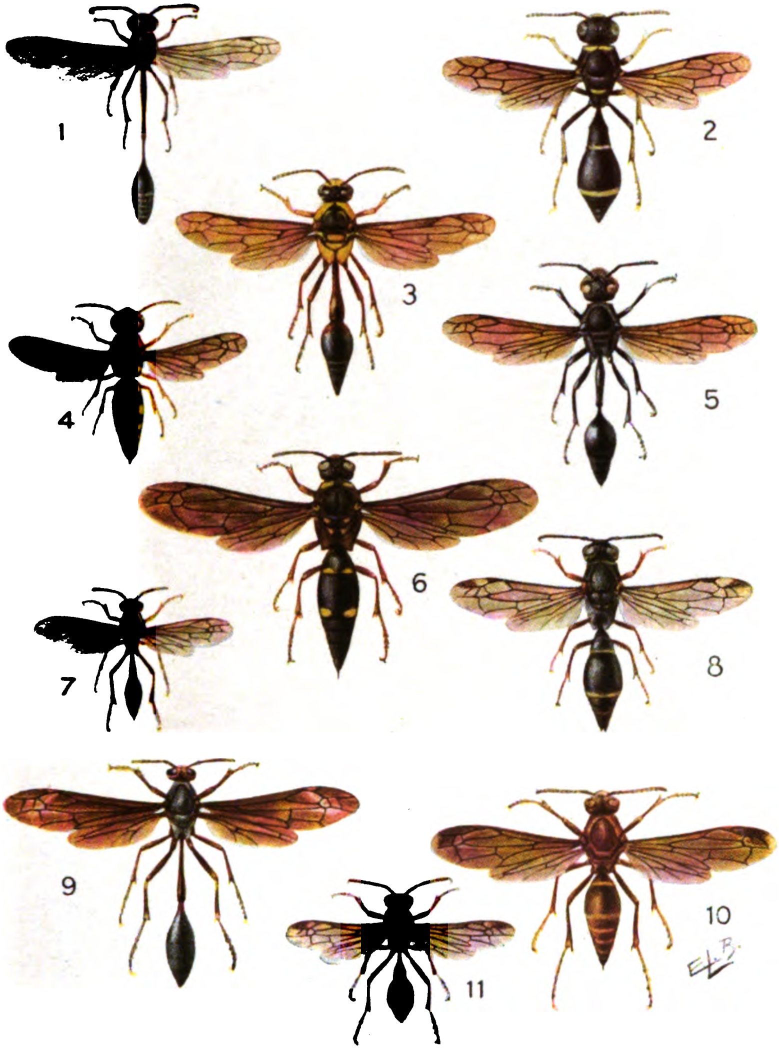
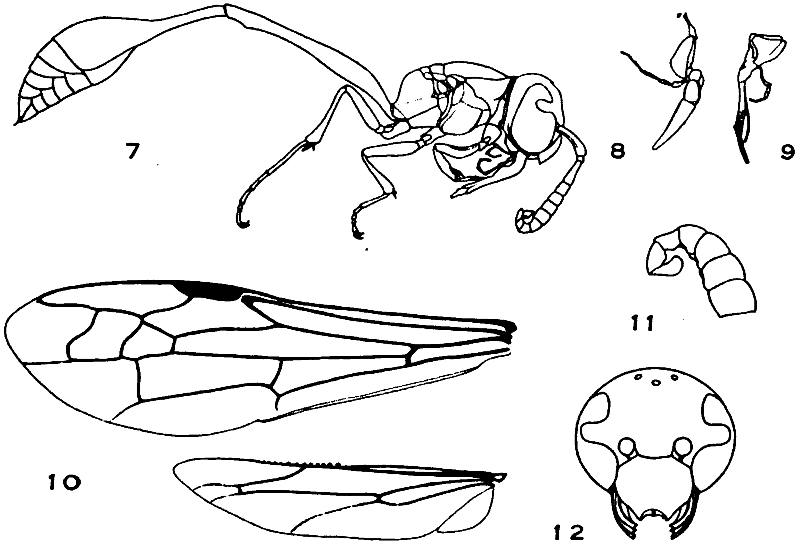


Fig. 1. *Paramischocyttarus buyssoni* Grib. × 2.
Fig. 2. *Pachymenes congensis* J. Beq. × 3.
Fig. 3. *Eumenes maxillosus* var. *tropicalis* (Sauss.) × 1.
Fig. 4. *Odynerus osborni* J. Beq. × 1.
Fig. 5. *Zethus rodhaini* J. Beq. × 2.
Fig. 6. *Synagris æstuans* (Fabr.) × 1.
Fig. 7. *Polybioides tabida* (Fabr.) × 2.
Fig. 8. *Ancistrocerus kisangani* J. Beq. × 3
Fig. 9. *Belonogaster junceus* (Fabr.) × 1.
Fig. 10. *Polistes fastidiosus* Sauss. × 3.
Fig. 11. *Ropalidia guttatipennis* (Sauss.) × 2.

scutellar suture on the middle line. Scutellum comparatively short and broad, scarcely twice as long as the postscutellum; flat; without carinæ or teeth. Postscutellum very short; transverse; entirely horizontal; flat; without ridge, carina, or tooth. Mesopleura with a sharp vertical carina limiting the epicnemia of the front legs, and with lines of deep punctures indicating the limits of the epimera and a division of the episterna into an upper and a lower plate. Propodeum comparatively long and strongly convex, with a very long horizontal face behind the postscutellum on the middle line, very broadly rounded towards its posterior slope; this hind part is not excavated in the middle, but presents only a narrow longitudinal groove which ends in a deep hollow above the articulation of the abdomen. Propodeum without carinæ or projecting angles of any kind; the valvula at the articulation of the abdomen raised in two minute, but very sharp teeth. Legs, as compared with the abdomen, short, but rather thick, especially the middle and hind tibiæ which are inflated towards the apex. Hind tarsi elongate, slender; hind coxæ with a sharp ridge, but without tooth on their upper face; hind tibiæ without spines on their outer side. Middle tibiæ with two apical spurs. Claws deeply bifid before the apex.



Figs. 7–12. *Paramischocyttarus buyssoni* Gribodo.

Fig. 7. Body in profile, ♂. Fig. 8. Maxilla and maxillary palpus, ♀. Fig. 9. Labium and labial palpus, ♀. Fig. 10. Venation of wing, ♀. Fig. 11. Terminal joints of antenna, ♂. Fig. 12. Head in front, ♀.

Wing venation (Fig. 10) of the ordinary *Zethus* type and apparently variable. The first discoidal cell extraordinarily long and narrow, as is usual in the Zethinæ; its apex vertically truncate; the first recurrent nervure running almost in a straight line with the inferior margin of the second cubital cell. The second cubital cell distinctly triangular, much narrowed, sessile or shortly petiolate on the radius. The discoideus starts about the middle of the nervulus.

Abdomen extremely elongate and slender; its total length two and one-half times that of head and thorax; the terminal segments are usually not telescoped within the second. First segment very long and narrow, longer than head and thorax together, only very feebly curved in profile; seen from above, its sides are subparallel, the tergite being faintly widened in its basal half and at its apex; its apical angles, however, not projecting at all. Second segment strongly narrowed over its basal half into a long, petiole-shaped neck, which is even narrower than the first tergite; its terminal half gradually swollen behind.

Punctation uniformly coarse and dense on head and thorax, including the clypeus and the propodeum; the punctures more remote on the mesopleura; the ventral lateral areas of the propodeum with a few transverse striæ; the surface of the antennal scape also punctured in front. Tegulæ impunctate, smooth, and shining. Abdomen impunctate, moderately shining, microscopically chagrined. Head and thorax densely covered with silvery pubescence which becomes long and hairy on the dorsal face, especially on the vertex, pronotum, and propodeum. Abdomen with a feeble, grayish bloom.

Black.. Clypeus for the most part or only towards its apex, a small spot in the emargination of the eyes, and another, larger one, on the upper part of the temples, antennæ on their under side, the ventral face of the abdominal petiole more or less distinctly, tegulæ and valvula of the thorax, and legs are almost entirely ferruginous-red. This color may invade nearly the whole of the petiole in some specimens. A small transverse spot in each anterior angle of the pronotum, the posttegulæ, two triangular spots at the apex of tergite 1, and a narrow undulate transverse band near the hind margin of the tergites 2 to 6 and of the sternites 4 to 6, whitish-yellow; the transverse preapical bands often interrupted in the middle. In some specimens the outer side of the middle and hind tibiæ is also spotted with straw-yellow. Wings slightly and uniformly infuscated, with purplish effulgence, their stigma dark brown. The coloration is not very variable.

Length (h. + th. + t. 1 + 2), 11.5 to 14.5 mm. (total length up to 16 mm.).

♂.— (Fig. 7.) Differs only by the usual sexual characters. Head and clypeus shaped almost exactly as in the female, but the emargination of the apical margin of the clypeus presents a more distinctly projecting tooth on its middle line. Mandibles tridentate at their apex. The shape of the three terminal joints of the antennæ is very peculiar and is similar to what is known for *Belonogaster* males. It is very different from that of the other Zethinæ with antennæ spirally rolled up in the male, such as *Zethus mexicanus* (Linné). Antennæ comparatively elongate, distinctly swollen towards the middle of the flagellum; their third joint about as long as the fourth and fifth together; joints 8, 9, and 10 have a short tubercle at the under side; joints 11, 12, and 13 are much flattened, of about the same length and as a rule spirally rolled up (Fig. 11); joints 11 and 12 are distinctly dilated in their middle beneath; the thirteenth joint is broadly spatulate at its apex. Tarsal claws not so deeply bifid as in the ♀.

The coloration also similar to that of the ♀: the clypeus is nearly entirely yellowish white; there is a stripe of the same color on the under side of the antennal scape and at the outside of the hind tibiæ. The four terminal joints of the flagellum testaceous, the terminal joint black at the apex.

Length (h. + th. + t. 1 + 2), 13 to 15 mm.

Belgian Congo.— Apparently one of the common wasps, often found on the flowers of *Bidens pilosa* Linné. I have seen specimens from Banana, Sept. 1915, 9 ♂♂ and 4 ♀♀; Zambi, June 1915, 3 ♂♂ and 7 ♀♀; Boma, June 1915, 2 ♂♂ and 1 ♀; Matadi, June 1915, 1 ♂; Thysville, June 1915, 1 ♂ and 1 ♀; and Garamba, June 1912, 1 ♂ (Lang and Chapin Coll.); also Boswenda, 1900 m., October 1914, 1 ♀ (J. Bequaert Coll.).

Labus H. de Saussure

In 1867 H. de Saussure described as *Labus* a genus of solitary wasps which has since received many different interpretations. It is, therefore, necessary to go back to the original diagnosis in order to decide which species really belong here. Saussure's generic diagnosis is as follows:

> Mandibles short and truncate; their apex, but not their inner margin, dentate; folded horizontally close to the clypeus, forming a very short beak. Maxillæ subelongate, with 6-jointed palpi. Labium subelongate, with 4-jointed palpi. Pronotum small, broad, with tooth-like anterior angles, narrowed and emarginate behind. Legs slender; tarsi elongate, their first joint the longest. Wings normal, Second cubital cell not petiolate, but angularly narrowed towards the radial cell, projecting and truncate towards the base of the wing, receiving both recurrent nervures, the first recurrent nervure being the continuation of the under margin of the second cubital cell. Radial cell broad, truncate or bluntly rounded at its apex. Abdomen with a very long petiole, which is linear, only slightly dilated at its apex.[1]

H. de Saussure adds, furthermore, that this well-defined type belongs to his group of the Zethites, characterized by the short mandibles, which are not long enough to form a beak and which consequently fold horizontally above each other behind the anterior margin of the clypeus. This genus, he says, comes nearest to *Elimus* of which it may be considered a subgenus, according to the structure of its mouth parts. However, the shape of the body is very different and gives it a peculiar appearance. It further differs in: (1) The thorax, which is small, broad, strongly toothed anteriorly, not rather attenuated as is the case in *Elimus;* much narrowed and nearly pointed posteriorly. (2) The abdominal petiole, which is very narrow, not swollen into a tubercle in its middle or on its upper side, and only slightly widened towards its apex. (3) The legs, which are much more slender. This and the shape of the clypeus bring this genus somewhat near certain social wasps, such as *Polybia* (in the old, broad sense, as used by de Saussure), though the clypeus is not pointed nor angulate but somewhat rounded at its anterior margin. (4) The venation of the front wings, which is very peculiar. The radial cell is broad, truncate or blunt at its apex; the second cubital cell ends in a sharp angle on the radial cell; the second intercubitus is slightly, and the first intercubitus very sharply, oblique — as a result, the second cubital cell is elongate towards the base of the wing, the internal angle thus formed being, however, truncate. The inferior margin of the second cubital cell is the prolongation of the first recurrent nervure, running in exactly the same direction. The inferior inner angle of the second cubital cell is closed by a small cross vein which descends vertically from the first intercubitus on the first recurrent nervure. The first intercubitus is so oblique as to form the prolongation of the inferior margin of the first cubital cell. Third cubital cell large, rectangular, somewhat widened towards its apical border.

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[1] Reise der Novara, Zool., II, 1, Hym., 1867, p. 3.

Two species were originally included in the genus: *L. spiniger* Saussure, from Java, and *L. humbertianus* Saussure, from India; but a genotype was not designated.[1] The essential characters were shown on Plate I, Figs. 1 and 2, by good drawings. From the description of *Labus humbertianus* it appears, furthermore, that, in the male, the terminal joint of the antennæ is recurved into a hook.

Unfortunately, H. de Saussure very soon modified entirely his first view as regards this genus. In his Synopsis of American Wasps,[2] we find a much shorter diagnosis which retains only: the short, obliquely truncate mandibles, with 3 or 4 terminal teeth; the 6-jointed, elongate maxillary and 4-jointed labial palpi; the rounded, inflated head; the rounded or truncate clypeus; the elongate thorax, which ends anteriorly in sharp lateral angles; the very slender abdomen, with its elongate, linear petiole. As to the wing venation, the author merely says: "Wings somewhat as in *Eumenes* and *Zethus*." These changes were apparently brought about by the discovery of a new wasp from Chile, which was described as *Labus sichelianus*. However, in the same paper H. de Saussure divided *Labus* into two groups: the first to include *Labus spiniger* and *L. humbertianus;* the second, *L. sichelianus*. He adds in a footnote: "The genus *Elimus* would make a third type."

In his later work on the Hymenoptera of Madagascar, the same writer apparently returned to his original idea concerning this genus.[3] This can be seen from the generic characters given and still better from the synopsis of the species known to him, in which we find only *L. spiniger* and *L. humbertianus*, besides the new Malagassan form, *L. floricola*. The last named species is evidently very closely related to the two others.

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[1] The genotype was designated by Bingham as *L. spiniger* Saussure (Fauna Brit. India, Hym., I, 1897, p. 348). The same author contributed a good description and figure of *L. humbertianus* Saussure (Idem, pp. 348–349, fig. 100).

[2] Smithsonian Miscell. Coll., No. 254, 1875, p. 56.

[3] In Grandidier, Hist. de Madagascar, XX, Hym., 1890, pp. 149–151, Pl. XXII, fig. 3.

Moreover, H. de Saussure does not mention *Labus sichelianus*[1] in this paper.

In 1891 Gribodo proposed a new genus, *Stroudia*, for a South African species, *S. armata* Gribodo.[2] From his description it appears that this cannot be separated from *Labus* Saussure in its original sense. This was pointed out by F. Kohl,[3] who has contributed descriptions of many African species, true representatives of *Labus* Saussure, and also an excellent review of the species of the genus known to him.

H. de Saussure described, half a century ago, under the name *Smithia*,[4] a type of solitary wasps of which apparently very little is known at present. The generic diagnosis is very incomplete:

> This type appears to be closely related to the genus *Elimus;* I cannot, however, describe it completely, since I was unable to make a dissection of the mouth parts. Head large, inflated, the antennæ inserted below its middle. Thorax much elongate; metathorax (= propodeum) elongate behind, narrowed, notched posteriorly. Abdomen with a long peduncle; the linear petiole as long as the thorax; the rest of the abdomen piriform. Second cubital cell petiolate, receiving both recurrent nervures; its posterior margin (= inferior margin) broken, the first recurrent nervure ending at this angular bend. This genus will be easily known; as soon as one has recognized a vespid by the shape of the prothorax which extends to near the wings and by the other characters of the family, the peculiar wing venation and the shape of the abdomen will be sufficient to distinguish it from all other genera of Eumeninæ.

So far as can be judged from this diagnosis and from the morphological details given in the description of the species, *S. natalensis* Saussure, this type is evidently very similar to *Labus* Saussure, the only difference being the petiolate second cubital cell.

I received lately from Dr. H. Brauns two females of the South African *Smithia natalensis*. In one of them, the second cubital cell is, in both wings, closed exactly on the radius, but cannot be said to be petiolate; in the other specimen, this cell is very shortly petiolate on the left side, more distinctly so in the right wing. There is no further difference of generic value between these little wasps and the true *Labus*.

While collecting Hymenoptera in the Congo, my attention was frequently drawn to some apparently common, small solitary wasps, presenting a distinctly petiolate second cubital cell. However, together with these were taken other specimens very much like the preceding in shape, structural characters, and sculpture, except for the wing venation, in which the second cubital cell was open, although very strongly narrowed on the radial cell. In some cases, apart from these differences in the venation, no structural characters could be detected which would enable one to separate the two specimens as distinct species. A comparative study of these Congo wasps and of *Smithia natalensis* brought me to the conclusion that they all belong to the same generic type; the character of the open or petiolate second cubital cell cannot be given generic value among them, it being variable even within the limits of the same species. I have no doubt that they must be referred to de Saussure's genus *Labus*. The name *Smithia* Saussure, although older, must be rejected because it is preoccupied, and *Hymenosmithia* Dalla Torre, which has been proposed in lieu of it, also becomes a synonym of *Labus* Saussure.

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[1] I have seen a specimen of *L. sichelianus* Saussure, in the collection of the U. S. National Museum, in Washington. It was classified as *Discœlius* by Ashmead, apparently because of the presence of two apical spurs on the middle tibiæ. The species is closely allied to *Zethus* Fabricius in its broader sense, and can best be located in a group of its own, *Laboides*, as was suggested by Zavattari (Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, 1912, p. 65); it is certainly very different from the Old World *Labus*.

[2] Bull. Soc. ent. Italiana, XXIII, 1891, p. 264.

[3] Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249.

[4] Revue et Mag. de Zoologie, (2), VII, 1855, p. 371.

Ashmead,[1] in his classification of the Vespoidea, includes *Labus* Saussure in his "Subfamily Discœlinæ" which he characterizes by the presence of two apical spurs on the middle tibiæ. However, this character has not even generic value within the group of the Zethinæ. In this same paper, Ashmead proposes a new genus *Micreumenes*[1] for *M. curriei* Ashmead, a species which was never described; in his key the author places this new type near *Eumenes*, so that one would hardly guess that it is related to *Zethus*.

Through the courtesy of Mr. Crawford, I was able to study the type specimen of *Micreumenes curriei* Ashmead in the U. S. National Museum. This specimen is a male and belongs to the Zethinæ, because of its short mandibles which end at their truncate apex in three strong teeth. The original diagnosis of *Labus* Saussure (1867) applies exactly to this specimen. *Micreumenes curriei* agrees, furthermore, in every detail with the description of *Labus macrostylus* Kohl (1907). Though Ashmead's name is older, it cannot claim priority, since it was not validated by a specific description.

Dalla Torre brought the American wasps which were described as *Labus* in a genus of their own, *Wettsteinia*, including *Labus brasiliensis* Fox and *L. sichelianus* Saussure[2]; Zavattari comprises both species in *Zethus* Fabricius, forming for them two divisions: (a) *Wettsteinia* Dalla Torre, with *L. brasiliensis* Fox and *Zethus strigosus* Saussure; (b) *Laboides* Zavattari, with *L. sichelianus* Saussure and *Zethus carinatus* Smith.[3]

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[1] Canadian Entom., XXXIV, 1902, pp. 206 and 208.

[2] Genera Insectorum, Vesp., 1904, p. 13.

[3] Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, 1912, pp. 65 and 66.

The following diagnosis of the genus *Labus* is based on the African species, the only ones which I have seen so far. They are, however, very similar to *Labus spiniger* Saussure, which must be taken as the genotype.

Clypeus emarginate at its apex. Mandibles short; obliquely truncate at their apex; folded over each other and, when closed, for the most part hidden underneath the anterior margin of the clypeus; their apex tridentate in the male, quadridentate in the female; their outer surface with longitudinal grooves. Maxillary palpi 6-jointed. Labial palpi 4-jointed. Antennæ 12-jointed in the female, 13-jointed in the male; in the latter the terminal joint recurved as a hook at the under side of the eleventh joint. Tibiæ without spines on their outer side; the middle tibiæ with one or two apical spurs. Claws of the tarsi bifid at their apex. First abdominal segment very narrow, forming a long and slender petiole which is only slightly broadened towards its posterior extremity, and flattened or uniformly rounded on its dorsal face. Second abdominal segment subsessile or with a very short, narrowed basal neck. Wing venation remarkable by reason of the first cubital cell being much narrowed towards the radial cell or more or less petiolate, and the first recurrent nervure being almost the straight continuation of the inferior margin of the first cubital cell.

As characterized here, this genus differs from *Zethus* Fabricius, in its broader sense, in the second abdominal segment lacking a distinct basal neck; from *Elimus* Saussure and *Discœlius* Latreille, in the shape of the abdominal petiole, which is not swollen laterally and above.

Labus, as defined here, includes 22 species, of which 17 occur in the Ethiopian region, the others being found in the Oriental region. Only three are known from the Belgian Congo.

Apparently, no observations have been made on the life history of any species of *Labus*.

Key to the Congo Species of *Labus*

1. Abdominal petiole (segment 1) sublinear in its basal half, then rather suddenly widened towards its apex which is more than twice as broad as its base (Fig. 29). Postscutellum with two distinct tubercles near the middle line. Middle femora, ♂, with a projecting basal tubercle beneath. Antennal hook, ♂ Fig. 28. Length (h. + th. + t. 1 + 2), 7 to 8 mm. . *L. maculicollis* Cameron.

Abdominal petiole (segment 1) with almost subparallel sides, only slightly and very gradually widening towards its apex, which is not or scarcely twice as broad as its base. Postscutellum without distinct median tubercles, sometimes with an undulated ridge. Middle femora, ♂, without basal tubercle. . 2.

2. Propodeum with a broad and long, rugosely reticulate, horizontal, median portion, abruptly truncate behind. Abdominal petiole distinctly shorter than the thorax (including the propodeum). Second sternite, ♂, without transverse arcuate ridges on the sides. Antennal hook, ♂ (Fig. 36), very narrow and slender. Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.
L. garambensis, new species.

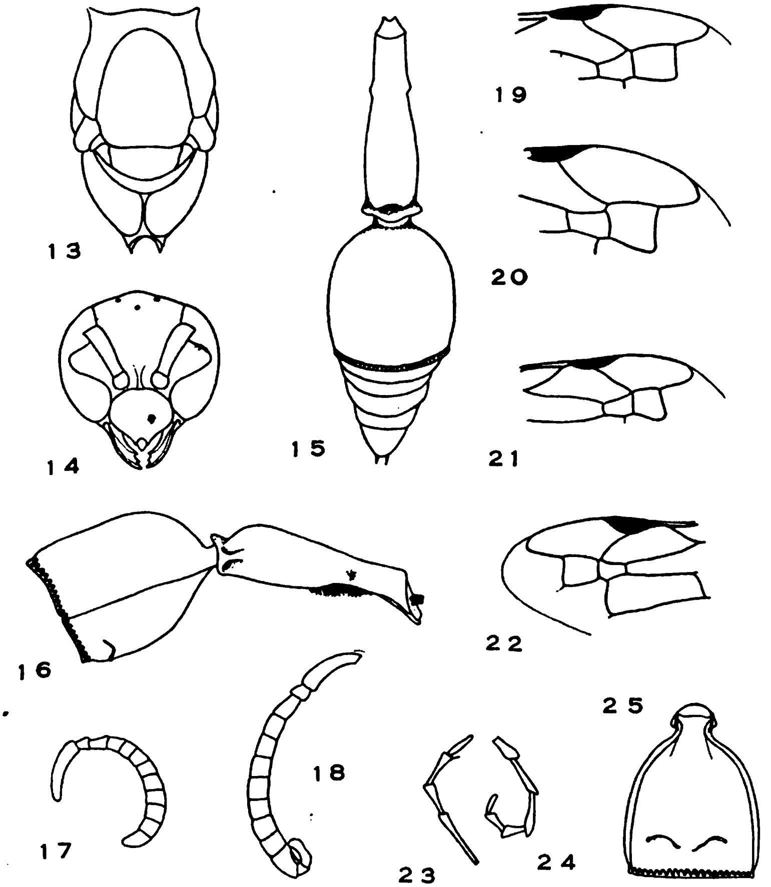
Propodeum convexly sloping behind the postscutellum, with a feeble median groove, finely punctate; abdominal petiole about as long as the thorax (including the propodeum). Second sternite, ♂, with transverse arcuate rimples in its apical third, on the sides. Antennal hook, ♂ (Fig. 18), thick and swollen in its apical half. Length (h. + th. + t. 1 + 2), 7 to 8 mm.
L. macrostylus Kohl.

4. **Labus macrostylus** Kohl

The following description of the male is made on the specimen from Liberia, which was named by Ashmead *Micreumenes curriei.*

♂.— Head (Fig. 14) broad; inflated; as seen from above, distinctly wider than the anterior margin of the pronotum; subcircular, as seen in front. Clypeus transversely piriform; much broader than long; gradually narrowed towards its apex, which is deeply emarginate, with sharply projecting lateral teeth; surface of the clypeus regularly convex. Oculo-malar spaces obsolete. Mandibles short, folded horizontally under the apex of the clypeus so as to cover each other partly, scarcely forming an obtuse beak when half opened. Inner margin of the mandibles obliquely truncate, with three strong and sharp terminal teeth; their outer surface with distinct longitudinal grooves. Temples and occiput sharply margined throughout. Inner orbits distinctly convergent towards the clypeus. Vertex moderately convex; the ocelli placed in a broad-based triangle, the posterior ocelli about as far from each other as from the inner margin of the eyes. Temples moderately broad; as seen from above, not more inflated than the eyes. Antennæ inserted much below the middle of the head and rather close to each other; long and slender (Fig. 18); the first joint of the flagellum comparatively large; the second rather short, only slightly longer than the third; the following joints elongate. The eleventh joint of the antennæ is much longer than the preceding, distinctly longer than broad, slightly emarginate on its inner face towards its apex and with a longitudinal, broad, smooth, and shining groove; the twelfth joint small; the thirteenth or terminal joint long, as long as the eleventh, hook-shaped, slightly curved, somewhat swollen towards its apical half; this thirteenth joint ends in a blunt apex which is folded back in the groove on the under side of the flagellum, reaching near the base of the eleventh joint. Maxillary palpi (Fig. 24) 6-jointed; their basal joint thicker and shorter than their second or third; their three terminal joints about of equal length, together much longer than the third, each of them shorter than either the second or third. Labial palpi (Fig. 23) 4-jointed; their basal joints the longest; their three terminal joints subequal.

Thorax (Fig. 13) elongate; as seen from above and including the propodeum, distinctly more than one and one-half times as long as broad on its middle. Pronotum narrowed anteriorly; with distinctly raised front margin, which, however, is not carinate but ends on either side in a very strong, outwardly projecting, blunt tooth. Mesonotum normal, small, distinctly longer than broad, with very indistinct traces of parapsidal furrows. Scutellum flattened, feebly convex. Postscutellum strongly rugose, without distinct prominent tubercles or median furrow. Propodeum rather short, as seen from above; its sides rounded, without carinæ; much narrowed towards its posterior extremity; its middle line only slightly grooved on its anterior horizontal portion, the furrow becoming much deeper on its vertical posterior part; above the insertion of the abdomen, the propodeum is deeply emarginate and ends on each side in a projecting lamella. As seen in profile, these terminal plates are sharply bidentate, the lower tooth being much longer and stouter than the upper one. Mesopleura without sutures dividing the episterna or separating the epimera; the mesopleura strongly swollen, with an anterior and a posterior depres-



Figs. 13–25. *Labus macrostylus* Kohl.

Fig. 13. Thorax from above, ♂. Fig. 14. Head in front, ♂. Fig. 15. Abdomen from above, ♂. Fig. 16. First and second abdominal segments in profile, ♂. Fig. 17. Antenna, ♀. Fig. 18. Antenna, ♂. Fig. 19. Front wing with broadly open second cubital cell, ♂. Fig. 20. Front wing with petiolate second cubital cell, ♀. Fig. 21. Venation of right front wing, ♂. Fig. 22. Venation of left front wing, ♂. Fig. 23. Labial palpus, ♂. Fig. 24. Maxillary palpus, ♂. Fig. 25. Second abdominal sternite, ♂. The drawings in Figs. 13 to 16, 18, and 21 to 25 were made from the type specimen of *Micreumenes curriei* Ashmead.

sion forming epicnemia for the front and middle legs; but these epicnemia are not bordered by raised carinæ. Legs comparatively long and heavy, especially those of the hind pair; the tibiæ distinctly widened towards their apical third; the outer surface of the tibiæ densely hairy, but not spiny. Middle tibiæ with a single apical spur. Tarsi slender, elongate; claws bifid at their apex. Base of the middle femora without a tubercle, but with a patch of grayish hairs at the under side.

Wing venation very similar on both sides (Figs. 21 and 22). The second cubital cell trapezoidal; much narrowed; closed or nearly so on the radial cell, though not petiolate. The first recurrent nervure in a straight line with the inferior margin of the second cubital cell; the first intercubitus very oblique, almost in the continuation of the inferior margin of the first cubital cell; this cell very large, larger than the second and third cubital cells together. Third cubital cell widened towards its apical margin, as long as or longer than high. Radial cell broad, very bluntly rounded at its apex, without appendiculate vein.

Abdomen long and slender (Figs. 15 and 16). Its first segment narrowed into an almost parallel-sided, cylindrical petiole, which is about as long as the thorax as seen from above. This petiole is very slightly widened in its posterior half and much more broadened towards its apex, so as to form two projecting rounded lateral edges. As seen in profile, the petiole dilates suddenly at a short distance from its base and is thence slightly swollen towards its posterior extremity. Its dorsal face presents, in front of its apical margin, a deep transverse depression followed by a terminal swollen, rounded ridge. Second segment distinctly shorter than the first; constricted at its base into a very short neck, which is much narrower than the dilated apex of the first tergite; thence bell-shaped with a duplicated terminal margin; its preapical, swollen, transverse portion bordered behind by a row of deep punctures. Second sternite in its posterior third, on each side of the middle line, with a slightly raised, short and arcuate, transverse rimple (Fig. 25).

Head and thorax densely and coarsely punctate; more finely on the propodeum, especially on its sides. Punctation of the abdomen very coarse on the first tergite (petiole), especially on its anterior part, much finer and remoter on the second segment; the following segments impunctate. The whole body covered with a very slight, grayish, bloomy pubescence, which becomes denser and more silvery on the clypeus, mesopleura, and tibiæ. On its under side the petiole, or first abdominal segment, presents about its middle a dense patch of long, silky-white hairs.

Black, with the following very reduced whitish-yellow markings: a large spot on the center of the clypeus; a short streak on the under side of the scape near its base; the projecting lateral angles of the pronotum; the posttegulæ; a transverse spot in each of the projecting angles at the terminal margin of the first tergite; a preapical, somewhat interrupted, narrow, transverse band on tergite and sternite 2, on their swollen portion; and the outside of the front and middle tibiæ. Terminal joints of the antennæ beneath and apical spurs of the tibiæ, testaceous. Wings slightly infuscate with a feeble purplish effulgence; a darker spot in the radial and towards the apex of the median cell.

Length (h. + th. + t. 1 + 2), 7.5 mm.

Other males I have seen differ only in some details of the color markings. These may be more or less extended; the preapical, yellowish band on the second segment may be more or less interrupted, in one of the specimens only a few traces of this band being left. The length (h. + th. + t. 1 + 2) varies between 7.5 and 8 mm.

♀.— Very much like the male, except for the following points: Antennæ (Fig.

17) short; moderately swollen towards the middle of the flagellum; the first joint of the flagellum comparatively long, the second very short, only slightly longer than the third, the terminal joint large. Mandibles quadridentate at their apex. Clypeus much as in the male, the emargination of its apex broader and not so deep, with sharply projecting lateral teeth. Thorax rather more elongate than in the male; the abdominal petiole or first segment also more slender, in profile distinctly less swollen behind than in the male, as long as the thorax; on its ventral face the patch of long pubescence is less distinct. Second sternite without raised ridges.

The coloration in some specimens is very much the same as in the male, but the clypeus is always entirely black; as a rule, the legs and antennæ are also black. One female from Boswenda (Kivu) is completely black except for the apical band of the first tergite. In other females, however, the apex of the antennæ is testaceous beneath, and all the tibiæ have whitish marks on their outside.

Length of the ♀ (h. + th. + t. 1 + 2), 7 to 8 mm.

The venation of the wings is very variable in both sexes, and it is hard to find two specimens which agree exactly in this respect. The second cubital cell may be distinctly open on the radial cell, or closed, or more or less petiolate. Specimens with petiolate second cubital cells should, of course, be referred to Saussure's genus *Smithia*, but since no other differences can be discovered between such specimens and others with open or closed second cubital cell, I do not believe that these details of the wing venation have even specific value. Figs. 19 and 20 show two extremes in the shape of this cell.

Belgian Congo.— I have seen specimens from Banana, 3 ♀ ♀, September 1915; Zambi, 2 ♀ ♀, 1 ♂, June 1915; and Faradje, 1 ♂, January 1914 (Lang and Chapin Coll.). Rutschuru, 1 ♀, 2 ♂♂, September 1914; Boswenda, 1900 m., October 1914; Walikale, January 1915; Lubutu, January 1915; Lukula, September 1913; and Thysville, June 1915 (J. Bequaert Coll.). Luebo, 1 ♂ (D. W. Snyder Coll.; U. S. Nat. Mus.).

Liberia: Mt. Coffee, 1 ♂ (R. P. Currie Coll.; U. S. Nat. Mus., No. 20617); type specimen of *Micreumenes curriei* Ashmead.

This species was originally described from Sierra Leone. The localities given in the present paper show that it has a very wide range, extending throughout the West African forest region as far east as Lake Kivu.

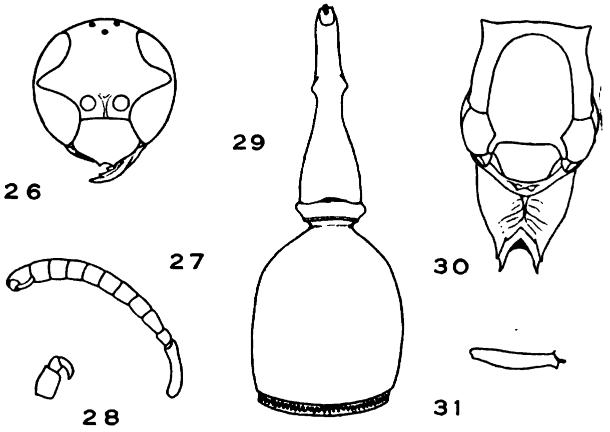
Labus annulipes Cameron (= *L. fragilis* Meade Waldo) is probably a synonym of *L. macrostylus;* if this be true, this species reaches East Africa and Rhodesia.

5. **Labus maculicollis** P. Cameron

This species comes very close to the preceding, so that it will be sufficient to point out the chief differences:

♂.— Head (Fig. 26) subcircular; the clypeus with a more shallow emargination at its apex. Mandibles tridentate at their apex. Antennæ (Fig. 27) similar to those of *L. macrostylus*, ♂, except for their terminal three joints; the thirteenth joint slender, strongly pointed, recurved into a hook and folded against the grooved under side of the eleventh joint (Fig. 28).

Thorax (Fig. 30) comparatively longer than in *L. macrostylus*. Pronotum with a raised, not carinate, anterior margin, ending laterally in very sharp, projecting teeth. Postscutellum slightly raised in the middle and with a median depression, so as to form two small projecting tubercles. Propodeum almost without punctures, but with a few transverse fine rimples. Middle femora only feebly narrowed towards the base, with a small but distinct basal tubercle projecting beneath (Fig. 31), without a basal patch of hairs. Middle tibiæ with two distinct apical spurs. Wing venation similar to that of *L. macrostylus;* in all the specimens I have seen the second cubital cell is distinctly petiolate.



Figs. 26–31. *Labus maculicollis* P. Cameron.

Fig. 26. Head in front, ♂. Fig. 27. Antenna, ♂. Fig. 28. Terminal joints of antenna, ♂. Fig. 29. First and second tergites from above, ♂. Fig. 30. Thorax from above, ♂. Fig. 31. Middle femur, ♂.

Abdomen (Fig. 29) long and slender. Its first segment very narrow, petiole-shaped; however, very distinctly widened behind its middle, its apex being much more than twice as broad as its base. This petiole is also distinctly flattened above in its posterior half; in profile its shape is much like in *L. macrostylus* but it is less swollen above in front of its preapical transverse furrow. There is no patch of long gray hairs on its under side. The second sternite does not present arcuate transverse rimples on its posterior third.

Sculpture coarse and dense, more remote on the clypeus; very fine, almost obsolete on the propodeum; the punctation is much finer on the second abdominal segment than on the first.

The coloration is variable, as in *L. macrostylus;* one of the males is colored almost like the type specimen of that species; but others are nearly entirely black, lacking even the yellow spots on the clypeus and on the projecting angles of the pronotum.

Length (h. + th. + t. 1 + 2), 7 to 8 mm.

♀.— Very much like the male, except for the secondary sexual characters. Mandibles quadridentate at their apex. Middle femora without a basal tubercle. These females can best be separated from those of *L. macrostylus* by the shape of the first tergite and the distinctly projecting tubercles of the postscutellum.

Length (h. + th. + t. 1 + 2), 7 to 8 mm.

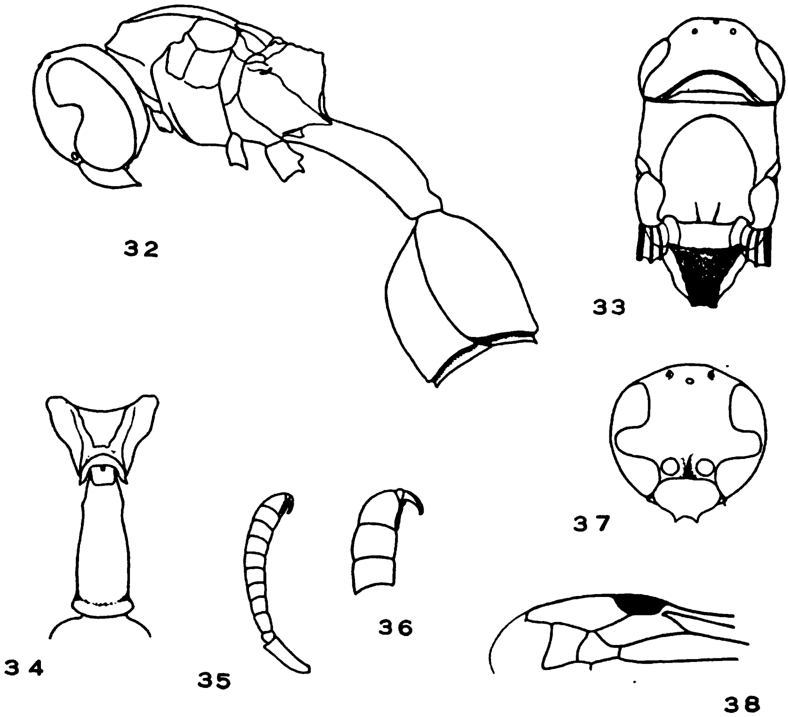
Belgian Congo.— Malela, 1 ♂, July 1915; Lukula, 1 ♀, Sept. 1, 1913; Lubutu, 1 ♂; and Rutshuru, 1 ♂ and 1 ♀ (J. Bequaert Coll.). Faradje, 1 ♂ and Stanleyville, 1 ♀ and 2 ♂♂ (Lang and Chapin Coll.). Previously known from Uganda and Mt. Kilimanjaro (1300 m.).

I have seen specimens of an apparently undescribed species from Zanzibar which also has, in the male, a projecting tubercle at the base of the middle tibiæ. But, it differs from *L. maculicollis* Cameron in the absence of spiny tubercles on the postscutellum and the different shape of the terminal joints of the antennæ; furthermore, the middle tibiæ are much narrowed in their basal third, their tubercle being much longer and sharper. It is unfortunate that none of the published descriptions of *Labus* record the shape of the middle tibiæ in the male.

6. **Labus garambensis**, new species

♀.— Head (Fig. 37) subcircular in front; as seen from above, much wider than the anterior margin of the thorax. Clypeus elliptic; broader than long; feebly narrowed towards its apical margin, which is broad; deeply arcuately emarginate with sharply projecting lateral teeth. Surface of the clypeus strongly convex. Mandibles short; folded horizontally beneath the clypeus; their inner margin oblique, with two sharp teeth in front of the elongate, recurved apex. Temples and occiput sharply margined. Vertex strongly convex, distinctly raised above the upper margins of the eyes when the head is seen in profile; without fovea; the posterior ocelli distinctly farther from each other than from the inner margin of the eyes, and about twice as far from the hind margin of the vertex. Antennæ inserted at the inferior third of the head, short; their flagellum distinctly inflated; their third joint scarcely longer than the fourth.

Thorax (Fig. 33) elongate; as seen from above and including the propodeum, about one and one-half times as long as broad at its middle. Pronotum only slightly narrowed towards its anterior margin which is almost straightly truncate and not carinate; only feebly raised on its sides and with outwardly projecting, sharp, lateral angles. Mesonotum nearly as broad as long, with feeble and short parapsidal furrows in front of the scutellum. Scutellum flattened, normal. Postscutellum comparatively long; transverse; without distinct median tubercles but with a transverse undulated crest, which forms on each side a raised lamella excavated in front; its surface entirely rugose-reticulate. Propodeum elongate, as seen from above; with a broad and long horizontal median part, which is abruptly truncate behind and almost vertically sloping on the sides. This horizontal face is almost as long as the scutellum and postscutellum together, and on the same level; it is very strongly projecting behind. Only the inferior half of the vertical face of the propodeum is excavated into a small, but very regular and deep, concavity in which the anterior face of the petiole fits when the abdomen is bent upward. The lateral decolorate lamellæ, which terminate the margins of the concavity on each side of the insertion of the abdomen, are very small in this species and form blunt teeth. From these terminal teeth a feeble longitudinal carina ascends the sides of the propodeum towards its stigmata. Mesopleura strongly swollen, with sutures dividing the episterna and separating the epimera; a distinct anterior carina borders the epicnemia of the front legs. Legs comparatively short and stout; the hind tibiæ distinctly swollen towards their apex, their outer surface not spiny, but densely clothed with long hairs. Middle tibiæ with a single apical spur. Hind coxæ with a very strong tooth on their upper face. Claws bifid before the apex.



Figs. 32–38. *Labus garambensis*, new species.

Fig. 32. Head, thorax, and two basal abdominal segments in profile, ♀. Fig. 33. Thorax and head from above, ♀. Fig. 34. First abdominal tergite from above and propodeum seen obliquely from behind, ♀. Fig. 35. Antenna, ♂. Fig. 36. Terminal joints of antenna, ♂. Fig. 37. Head in front, ♀. Fig. 38. Venation of front wing, ♀.

Wing venation practically the same on both sides (Fig. 38); of typical *Labus* type. The second cubital cell trapezoidal, much narrowed above, though distinctly open on the radial cell; the first recurrent nervure is the straight continuation of the inferior margin of the second cubital cell. First cubital cell distinctly larger than the second and third together. Third cubital cell short, much higher than long. Radial cell elongate, distinctly narrowed in its apical part, with a short trace of an appendiculate vein.

Abdomen (Fig. 32) elongate and slender; first segment forming a long, narrow, and almost parallel-sided, cylindrical petiole, which is distinctly shorter than the thorax as seen from above (Fig. 34), about two and one-half times as long as broad at its apex. This petiole is only very feebly and very gradually widened from its base towards its apex, which forms very blunt lateral edges. In profile, the petiole is suddenly raised above its base, then gradually swollen towards its middle, and presents a feeble transverse depression before its apex. Second segment scarcely shorter than the first; strongly constricted at its base into a very short neck, which is distinctly narrower than the apical margin of the first tergite. The whole of the second segment is bell-shaped, its sternite being distinctly convex and swollen near its base. Apical margin of the second tergite and sternite broadly decolorate, lamelliform, preceded by a feebly swollen transverse ridge, the furrow between both with a row of deep, minute pits.

Head, thorax, and abdominal petiole densely and coarsely punctate, almost reticulate; the sculpture of clypeus and tegulæ hardly different. Horizontal median part of the propodeum covered with a very coarse reticulum of deep pits. Second tergite and sternite uniformly and densely covered with very distinct punctures, which, however, are not so coarse as on the rest of the body. The following abdominal segments impunctate. Body covered with an abundant and dense, silvery pubescence.

Black, with the following ivory-white markings: a transverse fascia on the anterior margin of the pronotum, broadly interrupted on the middle line; a dot in the anterior angle of the tegulæ; the narrow inflated apical margin of the first tergite or petiole; the preapical inflated ridge on the second tergite and sternite, this preapical fascia continuing into the decolorate apical lamella; a stripe at the outer side of the front and middle tibiæ. Antennal scape and flagellum beneath, apex of mandibles, and larger part of front and middle legs, ferruginous. Wings subhyaline, slightly infuscate towards their anterior margin.

Length (h. + th. + t. 1 + 2), 6 mm.

♂.— Very similar to the female, including its sculpture and coloration. Clypeus more transverse; its apical margin almost semicircularly emarginate, with stronger lateral teeth; the sculpture of the surface much finer, its upper part being almost impunctate; the whole being covered with long and dense, silvery pubescence. Antennæ (Fig. 35), when compared with those of *L. macrostylus*, ♂, only feebly elongate; the flagellum distinctly swollen towards its apex; their third joint scarcely longer than their fourth; terminal hook or thirteenth joint small, slender, feebly curved, its apical half narrowed into a sharp apex which reaches the base of the eleventh joint (Fig. 36); this eleventh joint presents on its under side a narrow elongate furrow. Second sternite much as in the female, strongly convex, without preapical lateral rimples, not flattened on its middle. Middle femora without a tooth at their base beneath. Central part of the clypeus and under side of antennal scape ivory-white.

Length (h. + th. + t. 1 + 2), 6.5 mm.

Belgian Congo.— The holotype is a female from Garamba, July 1914; the allotype is a male from the same locality (Lang and Chapin Coll.).

The only described *Labus* to which this new species has apparently some relationship is *L. gracilis* Kohl from Arabia (Mount Sinai), a species which is very imperfectly known. However, the shape of the propodeum and the punctation of the abdomen are very different and do not allow any confusion between them. The form of the antennal hook in the male separates *L. garambensis* readily from the two other Congo species of the genus.

EUMENINÆ

Eumenes Latreille

About 250 species belonging to this genus are distributed throughout the world. A large number have been described from Africa, but most of them are based merely on color markings. As is so often the case among the Vespidæ, the coloration possesses an almost inexhaustible variability, and therefore the number of true specific forms will sooner or later have to be considerably reduced. Very valuable efforts in this direction have been made in recent years by A. v. Schulthess, who was able to compare the types described by various earlier writers, and his conclusions as to the relationship of different color variations to each other are, for the most part, accepted here. The number of Ethiopian species which may be separated on morphological characters is comparatively small. Both size and color may be very variable in all of them. A similar color pattern may be found in different species; moreover, different color varieties of the same species may occur together in the same region, sometimes together with similarly colored forms of other species, so that these color variations can hardly be considered as geographical races. Another important result of A. von Schulthess' investigations is to show us for the first time the very wide distribution of several species which were previously known under different names from different countries.

The color variations of many species of *Eumenes*, even outside the Ethiopian region, are made up by the combination of three colors: black, rufous-red, and yellow or whitish-yellow.

a) Totally black forms are very rare, most of the apparently black specimens showing some rufous marks, either on the antennæ, clypeus, or legs. *Eumenes melanosomus* var. *aterrimus* A. v. Schulthess comes closest to the perfectly black type, but even in that form the mandibles are rufous.

b) Black-and-reddish forms are very common. As a rule, the rufous color does not form definite markings but rather suffuses certain parts of the insect. Sometimes the body may be nearly totally rufous-red with very few black markings.

c) Black-and-yellow forms. The yellow color may present any tint from orange to deep yellow, sulfur-yellow, or even white; but nearly always the pale color forms definite markings, giving to a whole group of specimens a very peculiar appearance. This black-and-yellow type is more common in the temperate parts of the Northern Hemisphere, e. g., *E. coarctatus* (Linné) and *E. fraternus* Say; it is very rare in the Ethiopian region. I do not know of any species in which this yellow color extends over practically the whole insect.

d) Forms with a combination of black, ferruginous, and yellowish make up by far the majority of the color variations. Various parts of the body are suffused with rufous, while the yellowish markings are well defined. In some extreme cases, the black color has nearly completely disappeared, and the combination becomes yellow with rufous-red.

Since the species known from the Belgian Congo are not numerous, little need be said of the various attempts to divide *Eumenes* into natural subgenera. *Pareumenes* may be accepted as a distinct genus and located in the Zethinæ on account of its short mandibles, which end in a truncate and dentate apex. Later on, I shall give the reasons for believing that *Pachymenes* is best considered as a genus; it forms the natural transition between *Eumenes* and *Odynerus* subgenus *Rygchium* and also shows relationship to some social wasps. It may be well to point out that the "subgenus *Eumenidion*," recently proposed by A. von Schulthess,[1] is strictly synonymous with *Eumenes* Latreille, the "typus subgeneris: *E. coarctatus* L." being the genotype of *Eumenes* as designated by Latreille himself.[2]

Ethology. Observations have been published on the habits of several species from Europe [*E. coarctatus* (Linné), *E. arbustorum* (Panzer), *E. unguiculus* (Villers)], North America [*E. fraternus* Say, *E. bollii* Cresson, *E. belfragei* Cresson, *E. smithii* Saussure], South America [*E. canaliculatus* (Olivier) and several others], the Oriental region [*E. maxillosus* var., *E. germaini* Lucas, *E. dorycus* Maindron], and Africa [*E. maxillosus* (de Geer), *E. caffer* (Linné)]. All these agree in describing the females as "potter wasps": the females construct globular or oval nests of clay or of sand and mud mixed; these nests are attached to twigs of shrubs or trees, to walls, or to stones. The number of cells is variable, but never very large; the smaller species apparently build isolated cells. When a mud cell is completed the female deposits an egg which is attached with a thread to the bottom. She then fills the cell completely with caterpillars and walls it up with mud. Maindron is the only observer to record that certain Oriental species prey indifferently on caterpillars and spiders, but his observations need verification.

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[1] Societas entomol., XXVIII, 1913, p. 2.

[2] Considér. génér. Crust. Arachn. et Ins., 1810, p. 438.

A more extensive account of the habits of some of the African species is given on pp. 65–68 and 72.

Key to the Congo Species of *Eumenes*

1. Posterior part of the mesopleura with a raised and sharp, vertical carina in front of their hind margin, bordering the epicnemia of the middle legs. Abdominal petiole very slender, with a longitudinal, shallow groove on its dorsal face. Hind margin of the second tergite slightly depressed.
E. melanosomus Saussure.
Mesopleura without raised posterior carina for the epicnemia of the middle legs. Abdominal petiole not canaliculate on its dorsal face..............2.

2. Apical part of the second tergite double: its posterior margin depressed, smooth and thin, preceded by a swollen ridge, both being separated by a deep and strongly punctate groove. Second tergite strongly punctate and with transverse rugosities on its posterior half. Small species; ♀ length (h. + th. + t. 1 + 2), 8 mm.................................*E. langi*, new species.
Apical part of the second tergite simple, without strongly depressed hind margin. Surface of the second tergite without transverse rugosities. Medium-sized or large species..3.

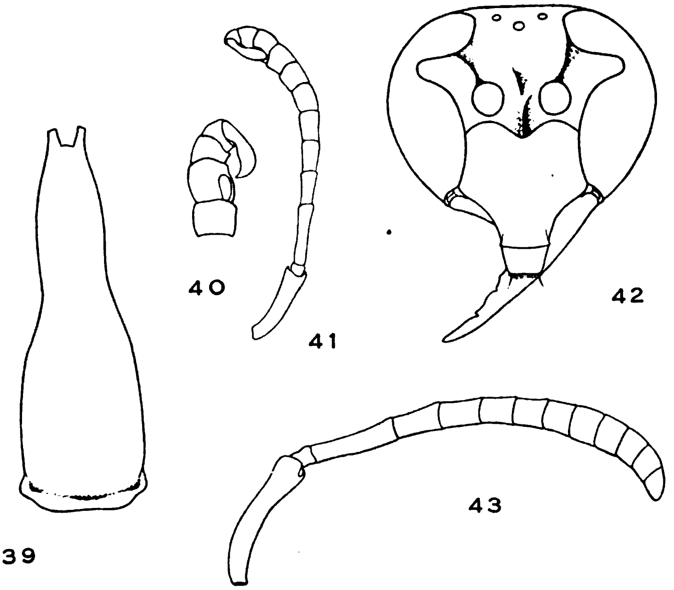
3. Thorax distinctly longer than wide or high. Abdominal petiole rather thick, shorter than the thorax, its basal half with subparallel sides; or the petiole slightly narrowed towards its middle; thence suddenly widened behind the projecting lateral stigmata; its apex distinctly broadened and bluntly angulate on the sides................................*E. maxillosus* (de Geer).
Thorax much shorter, the abdominal petiole slender, nearly as long as or longer than the thorax...4.

4. Abdominal petiole gradually widening from its base to its apex. Antennæ moderately swollen, in the ♀ about as long as head plus thorax; joints 8, 9, and 10 hardly as broad as long..................*E. lepeleterii* Saussure.
Abdominal petiole with subparallel sides in its basal as well as in its terminal half, suddenly widening behind its middle. Antennæ thicker, in the ♀ about as long as the thorax; joints 8, 9, and 10 as broad as or broader than long.
E. caffer (Linné).

Some practice is required to separate properly the females of *E. maxillosus*, *E. lepeleterii*, and *E. caffer*; but these species can always be easily identified in the male sex by the structure of the antennæ, of which drawings are given in this paper.

Eumenes maxillosus (de Geer)

♀.— Head (Fig. 42), as seen in front, scarcely one-fifth broader than high. Clypeus nearly as long as broad; its terminal margin straight or indistinctly curved outwardly, with sharp lateral edges in which terminate very short lateral oblique ridges. Front between the antennæ with a distinct, rounded protuberance, which is deeply grooved in its upper part. Antennæ (Fig. 43) short and inflated towards their apical half, about as long as the thorax, their terminal joints nearly as broad as long. Thorax about one-third longer than wide and high. Mesopleura with a more or less distinct suture dividing the episterna into an upper and under sclerite, without a carina in their posterior part. Scutellum with a very superficial, median, longitudinal carina in its anterior half. Abdominal petiole (Fig. 39) broad and thick, distinctly shorter than the thorax; its basal half with subparallel sides or even slightly narrowed toward its middle, where it is suddenly much broadened and presents on each side a distinct spine-like projection bearing the stigmata; its broader posterior half is distinctly widened towards its apex, where it ends in two blunt lateral edges. Upper surface of the petiole smooth, with a few remote punctures, convex and without a longitudinal groove. The petiole is scarcely more than three times as long as the width of its apex. Second abdominal segment strongly inflated; much narrowed towards its base, which in its constricted part is only half as broad as the apex of the petiole; its hind margin simple, not depressed; its surface apparently smooth, without any strong punctation; second abdominal sternite flattened or depressed on its middle, the depression sometimes very deep, especially in large specimens.



Figs. 39–43. ***Eumenes maxillosus*** **(de Geer).**

Fig. 39. First abdominal tergite from above, ♀. Fig. 40. Terminal joints of antenna, ♂. Fig. 41. Antenna, ♂. Fig. 42. Head in front, ♀. Fig. 43. Antenna, ♀.

Length (h. + th. + t. 1 + 2) varies considerably: from 28 to 30 mm. Occasionally one sees specimens which do not exceed 17 mm.

♂.— Differs from the female chiefly in the structure of the antennæ (Fig. 41) which are much longer; their flagellum somewhat moniliform, its different joints being slightly swollen in their middle. The terminal hook-like joint of the antennæ (Fig. 40) is very long and thick, curved beyond its base, and distinctly swollen in its terminal half; it ends in a sharp and strongly bent apex, which reaches the base of the tenth joint and reposes, on the ventral face of this joint, in a broad and deep excavation. Clypeus much longer than broad. Apical, or seventh, abdominal sternite with a very deep, median, longitudinal groove.

Length (h. + th. + t. 1 + 2), 12 to 23 mm.

The coloration of this species is exceedingly variable. A list, with synonymy, of its African varieties may be found at the end of this paper. Outside Africa, the Oriental and Australian *E. circinalis* (Fabricius), *E. conicus* (Fabricius) = *E. saundersii* Nietner, *E. xanthurus* Saussure, and *E. petiolatus* (Fabricius) must certainly be referred to *E. maxillosus* (de Geer).

Figs. 44 to 49 show the distribution of the different color variations of this interesting species, which is one of the most typical wasps for the Ethiopian, Oriental, and Australian regions. It has also invaded the southeastern part of the Mediterranean subregion, where other Ethiopian or Oriental elements are well known to occur mixed with the truly palearctic fauna.

Key to the Color Varieties of *Eumenes maxillosus* (de Geer)

1. Abdomen and thorax entirely black or with a few ferruginous tinges, always without yellow markings..2.
   Abdomen black with yellow spots, or extensively ferruginous-red or orange-yellow. Thorax often extensively yellow or orange-yellow..............4.

2. Wings entirely deep black, with purple effulgence. Body black, with a few rufous tinges on head, antennæ, legs and apex of first tergite. No yellow markings, except on clypeus and head of the ♂..typical *maxillosus* (de Geer).
   Wings not uniformly deep black....................................3.

3. Wings slightly suffused with brownish, becoming slightly and gradually darker towards their base. Black, with more or less extended ferruginous spots on head, prothorax, mesopleura, propodeum, legs, and apex of the first tergite; antennæ ferruginous-red. Head of the ♂ marked with yellow. Sometimes the whole of the first segment ferruginous-red.[1]......*circinalis* (Fabricius). (compare *xanthurus*).
   Wings dark brown in their basal half, subhyaline and somewhat milky in their apical half; the coloration as in *maxillosus*..............*reginus* (Saussure).

4. Abdomen abundantly marked with yellow; a small lateral spot near the apex of tergite 1 and broad transverse apical markings on tergites 2 to 5. Clypeus, a spot on the front and along the orbits, spots on pronotum, mesopleura,

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[1] The var. *ferrugineus* Magretti, of which I have seen no specimens, is apparently very similar to *circinalis* (Fabricius).

scutellum, postscutellum, propodeum, and legs, also yellow. Mandibles, base of antennæ, tegulæ, median part of tergite 1, a basal band on tergite 2, terminal segments, and legs, ferruginous-red. Wings subhyaline with a slight yellow tinge, especially towards their anterior margin. .*pulcherrimus* A. v. Schulthess.

Abdomen not marked with black, ferruginous, and yellow in the manner indicated above...5.

5. Body for the larger part bright orange-yellow or ferruginous-red.............6.

Body for the larger part black, the ferruginous-red and yellow color restricted to spots on the thorax and abdomen, or to the terminal segments of the abdomen...8.

6. Body for the larger part bright orange-yellow or orange-red; the posterior half of the mesonotum, scutellum, tegulæ, postscutellum partly, metapleura, base of tergite 1, basal half of tergite 2, and the whole of sternite 2, deep black; the two colors sharply separated. Wings tinged with golden-yellowish, smoky in the radial cell..................................*petiolatus* (Fabricius).

Body not sharply marked with black and orange as described above........7.

7. Almost entirely ferruginous-red, or the posterior part of the abdomen orange-yellow, but the second tergite always with a very distinct, narrow, transverse, black band, often interrupted in the middle. Head and sometimes also the anterior part of the thorax, more orange-yellow. Wings suffused with golden-yellow...*conicus* (Fabricius).

Dark ferruginous-red, with the posterior part of the abdomen (behind the middle of the second tergite) and often also the mesonotum black. Wings subhyaline at their base, brownish-black with purple effulgence in their apical half.[1]
dimidiatipennis (Saussure).

8. Head and thorax extensively marked with bright yellow; especially the mesonotum black with a comma-shaped yellow spot on each side in its anterior half. Mandibles, antennæ, legs, first and second segments, partly ferruginous-red; the abdomen mostly black, without yellow markings. Wings subhyaline with a feeble yellowish tinge.............*tropicalis* (Saussure).

Head more or less marked with yellow, especially in the ♂ (clypeus); thorax without any yellow, or the anterior margin of the pronotum narrowly yellow; abdomen sometimes with yellow spots on the first tergite.................9.

9. Black; thorax, head, legs, base of first and second segments, and the ventral face of the abdomen, mostly ferruginous-red. Two rectangular, elongate, well-marked spots on the apical part of the first tergite. Wings subhyaline with a yellowish tinge, slightly smoky in the radial cell....*fenestralis* (Saussure).

Black with ferruginous spots on the head and anterior part of the thorax; the terminal abdominal segments (behind the second) also ferruginous-red. Color of the wings as in *circinalis*, to which this variety is very similar.
xanthurus (Saussure).

I have been able to study nine out of the ten color forms which, on morphological characters, are here included in *Eumenes maxillosus* (de Geer);

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[1] After H. de Saussure.

the only form of which no specimens were available is *E. maxillosus dimidiatipennis* (Saussure), but there can be no doubt as to the relationship of this variety to the typical *E. maxillosus*. There are probably some more forms in the Oriental and Australian regions, described as species but which really belong to the group under discussion. Nevertheless, few other species of wasps give us, at the present time, so large a number of data for a study of variation and distribution.

The general area inhabited by the varieties of *E. maxillosus* is one which is occupied by many Old World wasps and other Hymenoptera too. But not until all students of Hymenoptera are willing to study the morphology of the species instead of describing paintings, may we hope to bring together reliable data on the many interesting problems connected with the distribution of insects in the Old World tropics. The geographic distribution of the genus *Ropalidia* and of the numerous forms which are very closely allied to *Odynerus hæmorrhoidalis* (Fabricius), if not merely color variations of a single morphological type, coincide in their broader lines with that of *E. maxillosus*. In the genus *Eumenes*, some other species, such as *E. caffer* (Linné) and *E. lepeleterii* Saussure, may also prove to extend over the Ethiopian, Oriental and Australian regions. However, there are undoubtedly true morphological species which are restricted either to the Ethiopian (*E. melanosomus* Saussure, *E. lucasius* Saussure), or to the Oriental or Australian (*E. bicinctus* Saussure) region. In other cases again, the range of the species includes only the Oriental and Australian regions, e. g., *E. arcuatus* (Fabricius). Even more striking facts will be disclosed when the distribution of the Palearctic and American *Eumenes* is studied in a similar manner.

It has been found that the life history of these different color varieties of *E. maxillosus* is the same (p. 67). The question arises now in how far these forms may be considered as geographical races. In comparing the maps, it will be seen that not one of these color forms extends over the whole range of the species, each of them being confined to an area of its own. Yet we can hardly consider them as true geographic forms, because most of them do not inhabit a given country to the exclusion of all others. The only exception to this rule is *E. maxillosus petiolatus* (Fabricius), which is the only form found on the Australian continent; however, in this case evidence in favor of a geographic race is not very strong, since this form extends over practically the whole of the Oriental and Australian regions. This applies also to *E. maxillosus dimidiatipennis* (Saussure), the only form known from Syria and Lower Egypt. In the other regions several color forms occur together: *E. maxillosus circinalis* (Fabricius), *E. maxillosus xanthurus* (Saussure), *E. maxillosus conicus* (Fabricius), and *E. maxillosus petiolatus*

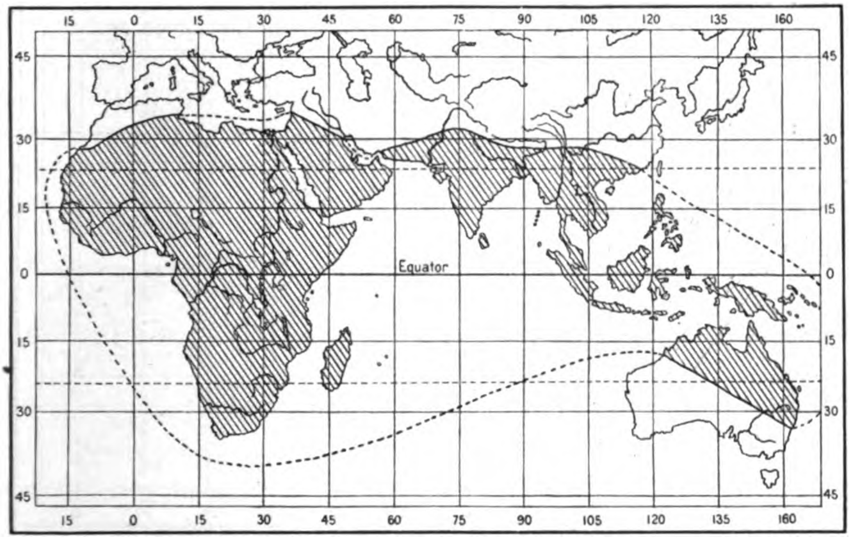

Fig. 44. Distribution of the morphological species *Eumenes maxillosus* (de Geer).

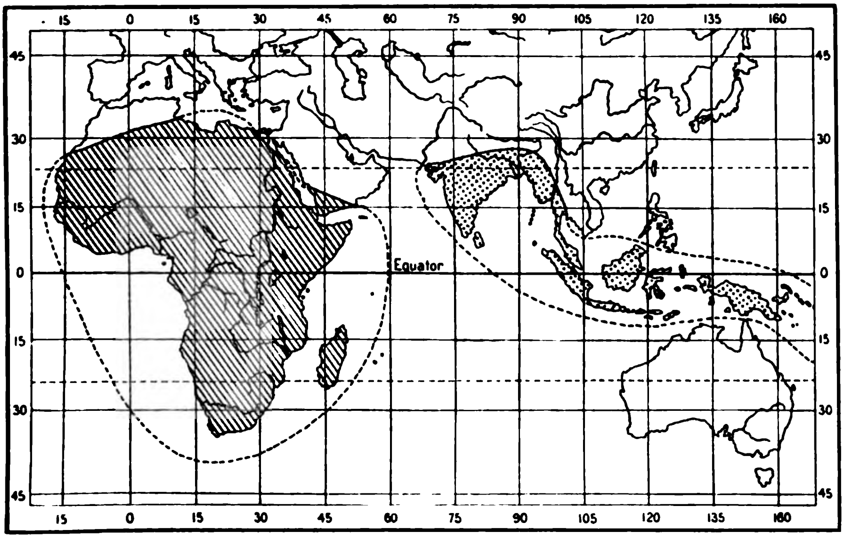

Fig. 45. Distribution of *Eumenes maxillosus* (de Geer), typical form — lines — and *E. m.* var. *xanthurus* (Saussure) — dots.

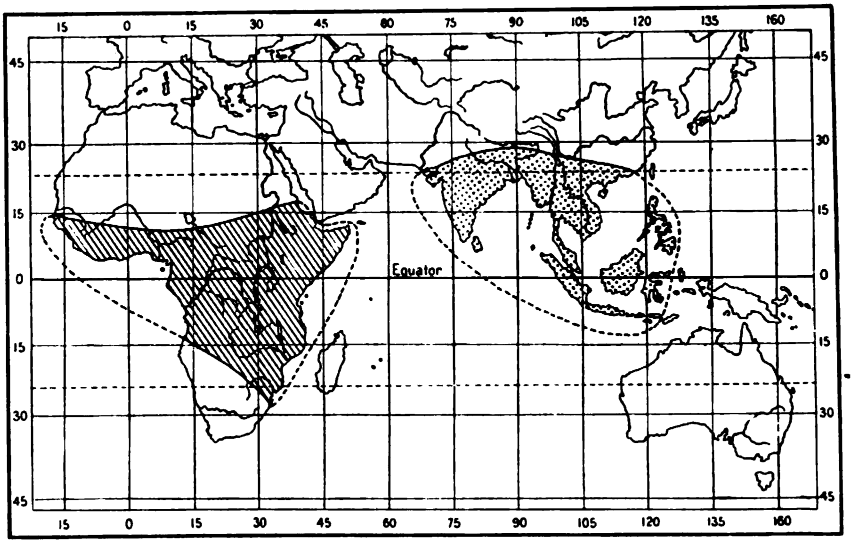

Fig. 46. Distribution of *Eumenes maxillosus* var. *fenestralis* (Saussure) — lines — and *E. m.* var. *conicus* (Fabricius) — dots.

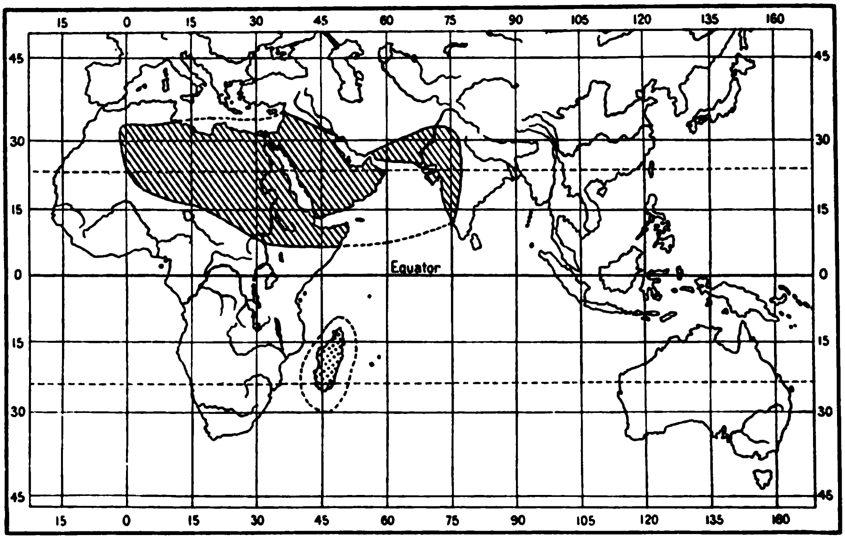

Fig. 47. Distribution of *Eumenes maxillosus* var. *dimidiatipennis* (Saussure) — lines — and *E. m.* var. *reginus* (Saussure) — dots.

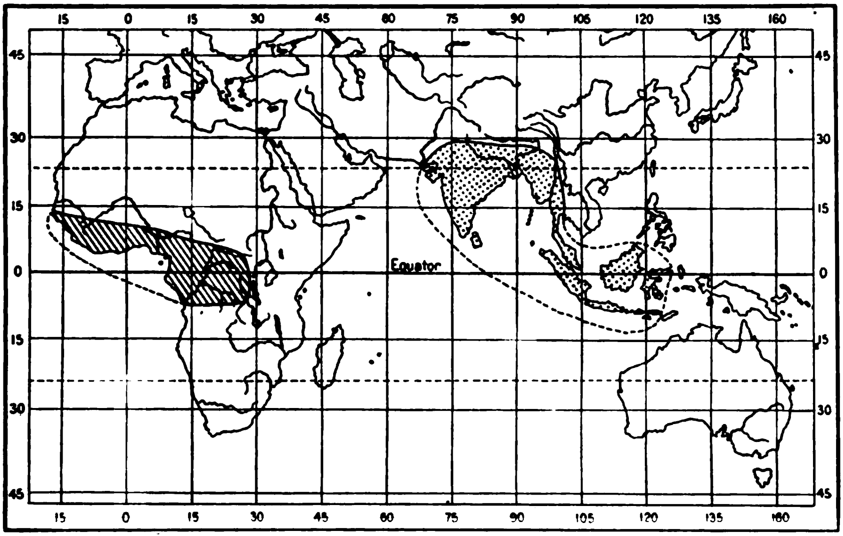

Fig. 48. Distribution of *Eumenes maxillosus* var. *tropicalis* (Saussure) — lines — and *E. m.* var. *circinalis* (Fabricius) — dots.

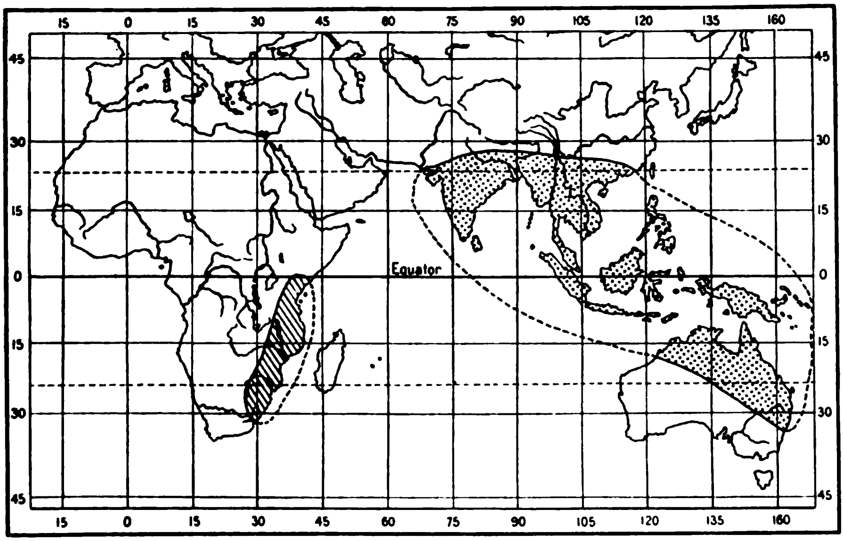

Fig. 49. Distribution of *Eumenes maxillosus* var. *pulcherrimus* A. v. Schulthess — lines — and *E. m.* var. *petiolatus* (Fabricius) — dots.

(Fabricius) in India and the Malay Archipelago; the typical *E. maxillosus* (de Geer), *E. maxillosus tropicalis* (Saussure), and *E. maxillosus fenestralis* (Saussure) in West Africa; the typical *E. maxillosus* (de Geer) and *E. maxillosus reginus* (Saussure) in Madagascar.

Only in a few instances is there any evident relation between the distribution of one of these forms and the climatic conditions or the vegetation of the inhabited area: *E. maxillosus dimidiatipennis* (Saussure) is apparently restricted to desert or sub-desert regions; *E. maxillosus pulcherrimus* A. v. Schulthess is found only in the East African savannahs; whereas the range of *E. maxillosus tropicalis* (Saussure), coincides fairly well with the limits of the West African rain forest and its extension as forest galleries into the surrounding savannah regions. Moreover, many other forms show no preference either for a dry or a moist climate, or for desert, savannah, or forest vegetation.

The fact that several color forms occur together in the same country brings us to a discussion of the intermediate color variations which are very often encountered. Such intermediate specimens will be considered by some students as linking the extremes, the idea apparently being that some of the different color patterns are merely individual variations of the ordinary fluctuating type. I believe, however, that this is not a true expression of the facts. If such fluctuating variation were the real cause of these different color forms of the morphological type *E. maxillosus*, the intermediate variations should be the most common and the extreme colorations ought to be much rarer. Study of a large amount of material, such as was brought together by the Congo Expedition, shows that this is not true. On the contrary, in this collection the color forms *E. maxillosus*, *E. maxillosus tropicalis*, and *E. maxillosus fenestralis* are each represented by a great number of individuals. Within each of these groups there is a certain amount of fluctuating variation in the size of the specimens and in the distribution of the different colors, the color pattern which may be called typical for the variety being far more common than any aberrant form. Color combinations intermediate between these three groups are always sporadic and it is often doubtful whether they are not merely extreme variants of one of the groups rather than true connecting forms. I am far from denying, however, that such intermediate forms do occur, but I believe that their scarcity gives some probability to the hypothesis that they are merely hybrids, produced through an accidental interbreeding of parents belonging to two different color types.

A point of interest is the occurrence in a given area of several varieties, very similarly colored, but belonging to species of *Eumenes* which may be easily separated on structural characters. The following are a few illustrations:

1. Typical *E. maxillosus* (de Geer), *E. lepeleterii hottentottus* (Saussure), *E. melanosomus aterrimus* A. v. Schulthess, and *E. caffer dyscherus* (Saussure), in West Africa.
2. Typical *E. lepeleterii* Saussure, typical *E. caffer* (Linné), and *E. maxillosus pulcherrimus* A. v. Schulthess, in Africa.
3. *E. maxillosus tropicalis* (Saussure) and *E. melanosomus æthiopicus* (Saussure), in West Africa.
4. *E. maxillosus fenestralis* (Saussure) and *E. lepeleterii tessmanni* A. v. Schulthess, in Africa.
5. *E. maxillosus petiolatus* (Fabricius) and *E. bicinctus* Saussure, in Australia. This case is of unusual interest because there are in Australia a number of Hymenoptera, belonging to different genera of solitary and social Vespidæ and Apidæ, all of which imitate the colors and pattern of *E. maxillosus petiolatus*.[1] I do not believe, however, that such a case can be included in the category of protective mimicry.

Ethology. The life history of *Eumenes maxillosus* has been completely worked out by E. Roubaud.[2] The mud nests of this species are sometimes very voluminous, the cells often numbering over 25, even 38; under unfavorable conditions, however, this number may be reduced to 4 or 5. These nests are commonly found on the walls of houses, inside or outside, more rarely on twigs, or tree trunks, or even on leaves or strong grass stalks. When attached to a wall, all the cells are disposed in a row side by side; when fixed to a stalk, the nest becomes an ovoid lump of earth. Very often the different chambers or cells are completely enclosed in a thick uniform mud covering. The mother wasp is never found inside the cell while in the course of building. In normal conditions, when the supply of food is abundant, this species follows the ordinary nesting rule of the solitary wasps: having fixed her egg in the bottom of the cell, the female accumulates hastily a provision of caterpillars and closes the cell before the egg hatches. *E. maxillosus* belongs, therefore, to that class of species characterized by "accelerated provision in mass"; indeed, the provisioning is so rapid that a single female may build and store four or five cells in forty-eight hours. However, during the dry season, or in desert regions, food becoming scarce and difficult to discover, the nesting is retarded and the prey is brought from day to day to the growing larva; the result being a marked decrease of the number of cells in each nest. The nesting instinct of this species may, under very unfavorable conditions, even present stranger aberrations: the female may deposit two or more eggs in a single cell amidst the provision of caterpillars, or she may even close up a cell with one or more eggs without any provision at all. The perturbation of the nursing habit may also lead to parasitic tendencies, the female wasp giving up the construction of a nest of her own to lay her eggs in the open cell of a neighboring female of the same species. Or else two females may constitute an abnormal and very rudimentary association to care for a single nest, one of them monopolizing the mason and nursing functions, whereas the other satisfies chiefly her reproductive instincts. "These associations, it is true, are still very imperfect and ill-defined; yet they are of unusual interest, as they permit us to catch in the very act the causes which directly determine a sudden and fundamental evolution of the solitary nesting habits of the Eumenidæ towards the behavior of the social wasps."[1]

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[1] R. C. L. Perkins, Proc. Zoolog. Soc. London, 1914, II, pp. 563–565.

[2] Ann. des Sc. naturelles, Zool., (10), I, fasc. 1, 1916, pp. 43–60.

The prey of this wasp consists of caterpillars. During the rainy season these belong chiefly to the Geometridæ, more rarely to the Sphingidæ, and the mother wasp shows a marked preference for very large caterpillars. A single one may then be the complete provision of a cell. During the dry months, however, the female has to hunt for smaller caterpillars belonging to various groups: Pieridæ and Noctuidæ besides those indicated above. In this case, the number of caterpillars stored in a single cell may attain a dozen.

A common and well-known true parasite of *Eumenes maxillosus* is the large chrysid wasp, *Stilbum splendidum* (Fabricius).[2] Roubaud reared from the nest of this potter wasp a cryptine, *Mesostenus tripartitus* Brullé; according to his observations this parasite devours first the young *Eumenes* larva and later on feeds partly on the stored caterpillars; sometimes several *Mesostenus* larvæ live inside a single cell. Several Tachinidæ, parasites of stored caterpillars, were also obtained from cells of *E. maxillosus;* the commonest, *Pachyophthalmus pelopœi* (Rondani), is of special interest because its larva feeds externally on the caterpillars stored as provision in the cells but apparently does not attack the *Eumenes* larva. This fly has been bred also from nests of *Pelopœus.* Its larval habits show that it is a specific parasite of solitary Hymenoptera and adapted to feed on the paralyzed, but still fresh, prey in their nests. How the adult *Pachyophthalmus* escapes from the closed mud cell is still unknown.

A few details of the ethology of *E. maxillosus* had previously been contributed by F. Smith,[3] Gueinzius,[4] Magretti,[5] H. Stadelmann,[6] and, more recently, by L. Schuster.[1] The observations of the last named author are interesting because they show that in East Africa also, during the dry season (June), the mother wasp feeds her larva from day to day with entire caterpillars. Gueinzius (*loc. cit.*) has given an interesting account of the oviposition of the parasite, *Stilbum*, in the hard mud-lumps of this potter wasp: "First it (the female *Stilbum*) uses its ovipositor as a gimlet, and when its point has a little penetrated, then as a saw or rasp; it likewise feels with its ovipositor, and finding an unfinished or an empty cell, it withdraws it immediately, without laying an egg."

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[1] E. Roubaud, *op. cit.*, p. 54.

[2] H. Brauns reared *Stilbum cyanurum* Forster var. *amethystinum* (Fabricius) from nests of *E. maxillosus* in South Africa (Zeitschr. f. wiss. Insektenbiol., VII, 1911, p. 17).

[3] Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 128.

[4] Trans. Ent. Soc. London, (2), V, 1858, p. 9.

[5] Ann. Mus. civ. Genova, XXI, 1884, p. 610.

[6] Deutsch Ost-Afrika, IV, 1898, Hym., p. 28.

The life history of the different color varieties is the same as that of the typical *E. maxillosus* (de Geer), so far as this has been ascertained. A. v. Schulthess[2] described the nest of *E. maxillosus reginus* (Saussure) from Madagascar. *E. maxillosus conicus* (Fabricius) = *E. saundersii* Nietner, has been repeatedly observed[3] and we also possess records of the nesting habits of *E. maxillosus circinalis* (Fabricius),[4] *E. maxillosus dimidiatipennis* (Saussure),[5] and *E. maxillosus petiolatus* (Fabricius) = *E. latreillei* Saussure.[6]

7. **Eumenes maxillosus** (de Geer), typical form

The first described, or typical, form is the African *maxillosus* (de Geer) = *tinctor* Christ. In this, the female is black with ill-defined rufous-red markings spreading over the head, the thorax, the abdominal petiole, and the legs; the antennæ too are often for the most part ferruginous. In some very dark specimens the rufous may be restricted to parts of the head, antennæ, and legs. The wings are deep black with a strong violaceous effulgence. The coloration of the male is similar, but the rufous is found on the posterior abdominal sternites also, and the clypeus and front between the antennæ are intensively spotted with pale yellow. It is very difficult to find two specimens presenting exactly the same distribution of black and rufous; but I have never seen one which was entirely black. This color variation and the varieties *dimidiatipennis* (Saussure), *reginus* (Saussure), *circinalis* (Fabricius), *xanthurus* (Saussure), and *petiolatus* (Fabricius) (= *latreillei* Saussure), include the largest specimens.

The typical *E. maxillosus* (de Geer) is very common on the African continent from Egypt (Cairo, Assuan), Tripoli, the Central Sahara, and

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[1] Zeitschr. f. wiss. Insektenbiol., VII, 1911, pp. 27–28.

[2] Reise Ost-Afrika, 1903–05, Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 71.

[3] Saunders, Trans. Ent. Soc. London, I, 1834, pp. 60–62; Menzel, Mitt. naturf. Ges. Zürich, II, 1848, p. 97; Nietner, Stettin. ent. Zeitg., XVI, 1855, pp. 223–226; Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1899, pp. 585–587; T. V. Aiyar Ramakrishna, idem, XX, 1910, pp. 341–343; C. Horne, Trans. Zool. Soc. London, VII, 1872, p. 166, Pl. xx, figs. 2 and 2a.

[4] Maindron, Ann. Soc. ent. France, (6), II, 1882, p. 172.

[5] E. Cretin, Journ. Bombay Nat. Hist. Soc., XIV, 1903, pp. 820–823.

[6] Maindron, Ann. Soc. ent. France, (6), V, 1885, p. 219; H. L. Roth, Journ. Linn. Soc. London, Zool., XVIII, 1885, pp. 321–323, fig. 2.

Mauritania to the Cape; it is also found in Southern Arabia, on Sokotra, the Comoros, and Madagascar; on Mt. Ruwenzori as high as 2000 meters.

Belgian Congo.— Perhaps the most common wasp of that country. I have seen 75 ♀♀ and 60 ♂♂ from Banana, Malela, Zambi, Boma, Matadi, Thysville, Lisala, Nouvelle Anvers, Stanleyville, Lubutu, Avakubi, Batama, Gamangui, Poko, Medje, Niangara, Faradje, and Garamba. It shows no preference for forest or savannah and is apparently common at every season of the year.

Ethology. Mr. Lang made, at Faradje, January 1913, the following field notes with regard to the nesting habits of the typical *E. maxillosus* (de Geer). This large mud wasp had built on the sides of a wooden box a semi-oval mud nest which, when completed, was about 46 mm. long, 34 mm. wide, and 15 mm. high; the only cell found inside was broadly oval, 13 mm. wide and 27 mm. long. The work of building the nest was observed from the beginning to the end and lasted six days. No clay was fixed against the walls of the box so that the cell was open behind; the walls were built in the shape of a ring from the periphery to the center, till only a small central opening was left giving access to the cell; then the female stored three green caterpillars inside and closed the opening. After this was done, the whole nest was plastered with another layer of mud till it reached the size indicated above; the external surface was fairly rough. Having completed the nest the female flew off and never came back. When opened after two weeks, the cell was found to contain only the dry skins of the three caterpillars together with numerous pupæ of small parasitic Hymenoptera. The female was often observed to fly for a distance of 50 yards to the water, and when she returned she was able to moisten and mason in succession two lumps of dry dirt of 3 mm. in diameter, which she gathered from the mud between the bricks of the houses. The wasp was, as a rule, only at work from eleven o'clock in the morning until two in the afternoon.

8. **Eumenes maxillosus** var. **fenestralis** (Saussure)

♀.— Head, antennæ, thorax, legs, and abdominal petiole extensively ferruginous. The black being restricted to the apex of the antennæ, the vertex, the mesonotum, spots on the pleura, and a median dorsal spot near the end of the petiole. Base of the second abdominal segment and the terminal segments with ill-defined red-brown spots. The following markings are pale ivory-yellow: two large rectangular spots on the sides of the dorsal apical half of the petiole, some indistinct spots in the emargination of the eyes and on the front between the antennæ, and a narrow line interrupted in the middle on the anterior margin of the pronotum. Wings subhyaline with a slight yellow tint and a dark violet spot in the radial cell. The male is very similar, but the clypeus and the front between the antennæ are completely ivory-yellow. Wasps with this coloration are as a rule medium-sized.

This color variety is known from Senegal, Congo, Angola, Zanzibar, and Mt. Ruwenzori (7000 ft.). It is apparently as common in the Belgian Congo as the typical *maxillosus*. I have seen 16 ♀♀ and 26 ♂♂ from Banana, Malela, Zambi, Boma, Matadi, Lisala, Garamba, Faradje, Vankerckhovenville, and the Semliki River (between Beni and Kasindi).

9. **Eumenes maxillosus** var. **tropicalis** (Saussure)

Plate I, Figure 3

♀ and ♂.— Black, with a few ferruginous tints on head, thorax, and abdomen. The head and thorax intensively marked with bright yellow. This yellow color extends over the clypeus; the front between the antennæ; the hind margin and emargination of the eyes; practically the whole of the pronotum; a very large spot on the mesopleura and on the scutellum; a triangular, somewhat arcuate spot on each side on the anterior half of the mesonotum; nearly the whole of the postscutellum; two very extensive spots on the propodeum; and, on the anterior legs, the outside of the tibiæ and of the apical half of the femora. The wings, as in the var. *fenestralis* Saussure. The yellow stripe on the scutellum is often suffused with rufous. In all my specimens the abdomen has no yellow marks. Medium-sized form.

The var. *tropicalis* (Saussure) was known from Senegal, Cameroon, and Spanish Guinea. It is widely distributed in the Belgian Congo: Thysville, Stanleyville, Garamba, Medje, Niangara, Faradje, Yakuluku, Walikale, Bafwabaka, and Gamangui. I have seen 21 ♀♀ and 11 ♂♂.

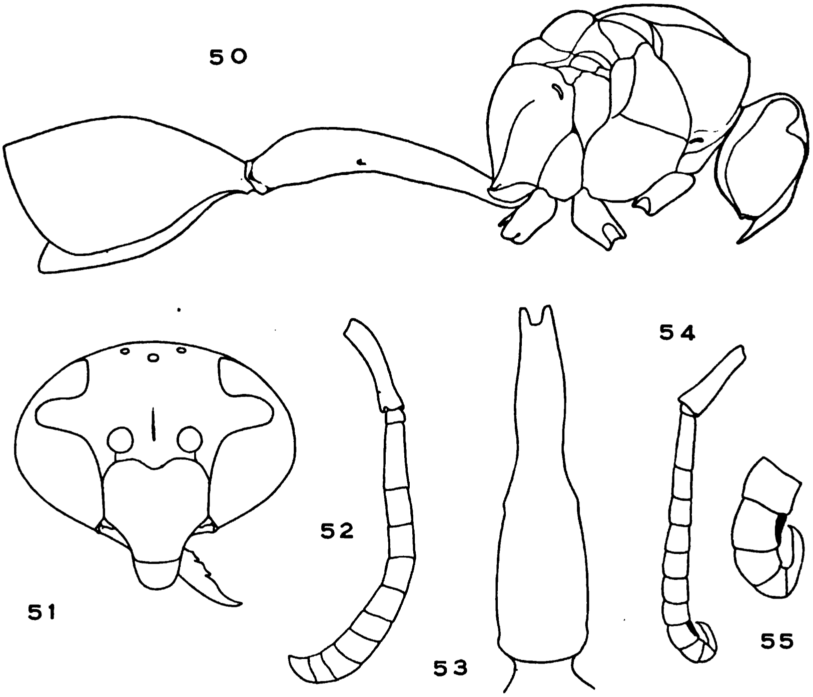
Eumenes caffer (Linné)

♀.— Head (Fig. 51), as seen in front, nearly one-fifth broader than high. Clypeus about as long as broad; its terminal margin straight or slightly curved outwardly; its edges rounded. Front slightly raised between the antennæ and with an upper longitudinal, superficial groove. Thorax (Fig. 50) short, but distinctly longer than broad or high. Mesopleura with a suture dividing the episterna into two parts, without carina in front of the epicnemia of the middle legs; the suture limiting the epimera also distinct. Scutellum with a superficial, but distinct, longitudinal median carina in its anterior half. Abdominal petiole (Figs. 50 and 53) about as long as the thorax, slender, subparallel in its basal as well as in its terminal half, suddenly widening behind its middle, with distinct but feebly projecting lateral stigmata; the petiole is more than four times as long as broad at its apex; its upper surface is not grooved, strongly convex, with a few remote, very minute punctures. Second abdominal segment much as in *E. lepeleterii*, its sternite normally convex. Antennæ (Fig. 52) moderately long, about as long as the thorax; their flagellum distinctly swollen towards its apex; joints 8, 9, and 10 as broad or broader than long.

Length (h. + th. + t. 1 + 2), 12 to 18 mm.

♂.— Abdominal petiole slightly longer than the thorax. Clypeus distinctly longer than broad. Flagellum of the antennæ (Fig. 54) scarcely swollen towards its apex, feebly moniliform. Its hook-like terminal joint (Fig. 55) has a shape nearly intermediate between that of *E. lepeleterii* and *E. maxillosus;* it is long and slender, with a broad base, slightly narrowed and feebly curved on its middle, again broader in its terminal part; its apex, however, is not spatulate, but ends in a sharp point which is concealed in a small excavation on the under side, near the extremity of the tenth antennal joint. Terminal sternite of the abdomen with a feeble, groove-like depression towards its apex.

Length (h. + th. + t. 1 + 2), 12 to 18 mm.



Figs. 50–55. *Eumenes caffer* Saussure.

Fig. 50. Head, thorax, and two basal abdominal segments in profile, ♀. Fig. 51. Head in front, ♀. Fig. 52. Antenna, ♀. Fig. 53. First abdominal tergite from above, ♀. Fig. 54. Antenna, ♂. Fig. 55. Terminal joints of antenna, ♂.

This species has a wide range, being known on the African continent from the Central Sahara and Mauritania to the Cape; the var. *esuriens* (Fabricius) is common in India, and I have seen specimens from Formosa and Queensland (Fig. 56).

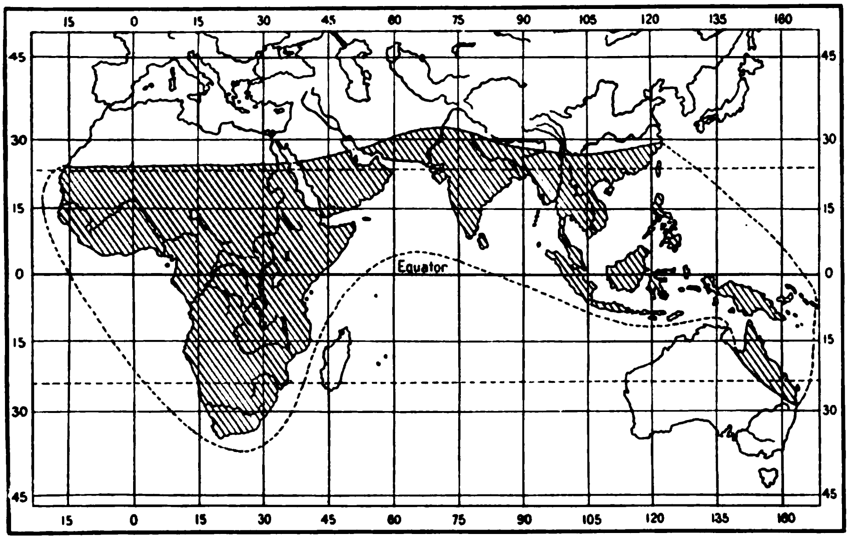


Fig. 56. Distribution of *Eumenes caffer* and its color varieties.

Key to the Color Varieties of *E. caffer* (Linné)

1. Body almost black, with a few ferruginous markings on head, thorax, legs, and petiole; head partly yellow. No yellow on thorax and abdomen.
dyscherus (Saussure).
Thorax or thorax and abdomen more or less marked with yellow............2.

2. Body, for the larger part, bright yellow; the mesonotum, as a rule, black; the abdomen, behind the petiole, with a broad black cross, the lateral branches of which run over the middle of the second tergite; a few ferruginous spots on head, thorax, and petiole (very similar to the typical *E. lepeletierii*).
typical *caffer* (Linné) (= *formosa* Saussure).
Abdomen behind the petiole not yellow with a black cross..................3.

3. Black, with abundant ferruginous markings on head, thorax, petiole, and base of second segment. The yellow restricted to the clypeus, spots on the head, a median stripe on the pronotum, spots on the legs, and sinuate preapical bands on tergites 3 to 5. Rarely the yellow more extended; in the ♂ the second tergite also, and even the petiole, with preapical spots.
gracilis Saussure.
Black with abundant ferruginous markings as in the preceding; very often a broad basal band of that color on the second tergite; the yellow markings much more abundant and more extended on thorax and abdomen; the abdomen is, for the most part, yellow behind the apical third of the second tergite.
esuriens (Fabricius).

Ethology. The habits of the var. *esuriens* (Fabricius) have been studied by C. Horne in India[1] and by E. Roubaud in West Africa.[2] The nest is similar to that of *E. maxillosus* (de Geer) but smaller, with 4 or 5 cells. The prey consists of caterpillars. A parasitic beetle (*Emenadia*) and a fly (*Anthrax*) were bred from its nest.

10. **Eumenes caffer** (Linné), typical form

The coloration of the typical form, as described by Linné, is very similar to that of the typical *E. lepeleterii* Saussure, with which it may be easily confused. Female and male are marked very much alike. The insect is extensively bright yellow. The following parts are ferruginous red: the antennæ for a large part; the mandibles; the anterior part of the tegulæ; the greater part of the petiole, with two large yellow terminal spots; the basal part of the second tergite; the second sternite except for its broad hind margin; and the legs with the exception of small yellow spots and stripes at the end of the femora and on the outside of the tibiæ. The black color covers the terminal half of the flagellum and a spot on the upper side of the antennal scape; the vertex; the mesonotum; a transverse stripe between the scutellum and postscutellum, and a vertical streak on the middle of the propodeum; a spot in the anterior part of the mesosternum; the extreme base of the petiole and a T-shaped spot near its dorsal apex; and a broad cross over the second tergite which continues on the middle of the following tergite, turning, however, somewhat brownish towards the apex of the abdomen. In the male, the under side of the antennal scape may be extensively yellow. Wings subhyaline, with a slight yellowish tinge and a feeble purplish spot in the radial cell.

Belgian Congo.— 13 ♀♀ and 14 ♂♂, all from the mouth of the Congo River: Banana, September 1915, and Boma, June 1915.

I can discover no differences between the description of *E. formosa* Saussure and my specimens of the typical *E. caffer* (Linné).

11. **Eumenes caffer** var. **gracilis** (Saussure)

The numerous specimens which I bring together under this name, have a similar general appearance, but they vary much in the details of the coloration. This variation, however, was well known to H. de Saussure himself.

The following is the more common form found in the Congo:

♀.— Mostly black and ferruginous. The latter color extends over the scape and the basal half of the flagellum; the mandibles; the greater part of the thorax, with the exception of all or part of the mesonotum and stripes along the different sutures, which are black; the legs; the abdominal petiole, with the exception of the

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[1] Trans. Zool. Soc. London, VII, 3, 1870, p. 166.
[2] Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 60.

black base and a large preapical black dorsal spot extending in the middle towards its apex; and the base of the second abdominal segment. The following parts are yellow: the clypeus; the front between the antennæ; the emargination and hind margin of the eyes; a median stripe on the pronotum, indistinctly interrupted; somewhat sinuate preapical bands on tergites 3, 4, and 5; and a few spots on the under side of the tibiæ. Wings as in the preceding variety.

The male sometimes offers the same coloration, but as a rule the yellow markings are more extended in this sex, especially on the abdominal segments; even the second segment may present preapical lateral yellow spots and a small yellow dot on each side near the apex of the petiole; the yellow may extend over part or whole of the pronotum, or even appear on the mesopleura.

The var. *gracilis* (Saussure) was known from India, Southern Egypt, and Senegal.

Belgian Congo.— I have seen 19 ♀♀ and 19 ♂♂ from Zambi, Boma, Matadi, Thysville, Leopoldville, Lisala, Stanleyville, Vankerckhovenville, and Bogoro.

12. **Eumenes caffer** var. **esuriens** (Fabricius)

A female from Stanleyville presents the following coloration. Black. Mandibles, antennal scape beneath, flagellum in its basal half and on the under side, posterior half of the tegulæ, two large spots on the scutellum (only separated by a narrow median line), large spots on the sides of the propodeum, petiole on its ventral side and in the middle of its dorsal side, large spots on the second sternite extending on to the sides of the tergite, anal segment, and legs, almost entirely ferruginous-red. The following markings are bright yellow: the clypeus; the front between the antennæ; the emargination of the eyes; the external orbits on the temples; the pronotum except for its posterior angles; a large spot in the upper part of the mesopleura; the postscutellum; elongate spots on the sides of the propodeum; two apical spots on the first tergite; broad terminal bands on tergites and sternites 2 to 5, the band on the second tergite interrupted in the middle; and spots on the outside of the femora. Wings subhyaline, with a golden-yellowish tinge and a black-purplish spot in the apical part of the radial cell.

A male from Bogoro is very similar; the ferruginous-red color is more extended on the abdomen, where it forms on the second tergite a broad basal band interrupted by a black median line.

These specimens differ from *esuriens* (Fabricius), as figured by H. de Saussure,[1] in having the yellow apical band on tergite 2 interrupted in the middle and the ferruginous-red color not extending over the whole of the base of the second tergite. But a numerous series of specimens from India,

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[1] Et. fam. Vesp., I, Eum., 1852, Pl. xi, fig. 2.

Formosa, and Queensland in the collection of the American Museum show very great variation as regards distribution of yellow, black, and ferruginous pattern in this form.

The var. *esuriens* (Fabricius) is the common form in the Oriental and Australian regions; but it was known also from Senegal.

Belgian Congo.— Stanleyville, 1 ♀, April 1915; Bogoro, 1 ♂, July 10, 1914.

13. **Eumenes caffer** var. **dyscherus** (H. de Saussure)

Very similar to a small *E. maxillosus* or *E. lepeleterii* var. *hottentottus*, but the shape of the abdominal petiole and of the antennal hook in the male place it undoubtedly with *E. caffer*. Black. Mandibles in their apical half, base of antennæ beneath, tegulæ partly, a few spots on the sides of the propodeum, the middle, under part and extreme apex of the petiole, and a few spots on the coxæ and near the apex of the tibiæ, -ferruginous-red. Clypeus entirely, a broad frontal spot, the inner orbits beneath the emargination of the eyes, and a small spot near the apex of the tibiæ, yellow. Wings tinged as in typical *caffer* (Linné).

Belgian Congo.— One male from Stanleyville, April 1915, represents a melanistic color variation of *E. caffer* and I refer it to *E. dyscherus*, a form which has escaped further notice since Saussure's original description. This specimen lacks the apical yellow margin of the petiole and the dark purplish wings described by H. de Saussure for his *E. dyscherus*.

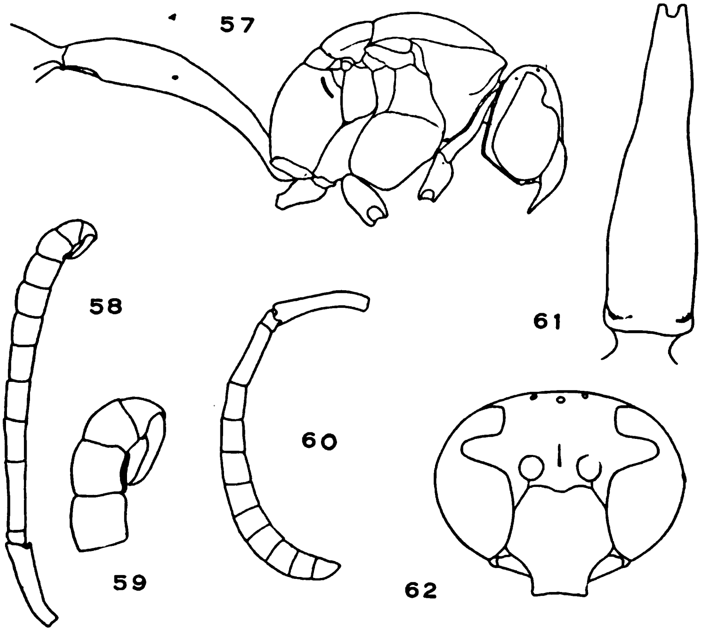
Eumenes lepeleterii Saussure

♀.— Head (Fig. 62) much broader than high. Clypeus nearly as long as broad; its terminal margin straight or feebly curved inwardly, with projecting blunt lateral edges. Thorax (Fig. 57) distinctly longer than wide or high, but much shorter than in *E. maxillosus*. Mesopleura without sharp carina in front of the epicnemia of the middle legs, but with a distinct suture dividing the episterna and another, deeper one, separating the epimera. Abdominal petiole (Figs. 57 and 61) about four times as long as broad at its apex; as long as, or scarcely longer than, the thorax including the propodeum; slender, gradually widening from its base to its apex; its lateral projecting stigmata feeble; its upper surface not grooved. Second abdominal segment strongly inflated, much narrowed and subpetiolate at its base; its constricted part, however, distinctly more than half as wide as the apex of the first tergite; second abdominal sternite not or scarcely depressed on its middle. Antennæ (Fig. 60) long, moderately inflated towards the terminal half of the flagellum; about as long as head and thorax together; joints 8, 9, and 10 hardly as broad as long.

Length (h. + th. + t. 1 + 2), 17 to 19 mm.

♂.— The abdominal petiole is more slender than in the female; about as long as head and thorax together. The clypeus is narrower; somewhat longer than broad. The flagellum of the antennæ (Fig. 58) is swollen towards its apex and feebly moniliform; its hook-like terminal joint (Fig. 59) is long and very slender, tapering gradually from a triangular base to a very sharp apex, which is slightly curved and reposes in a very small excavation on the middle of the under side of the tenth antennal joint. Last abdominal sternite with a deep, median, groove-like depression towards its apex.

Length (h. + th. + t. 1 + 2), 12 to 16 mm.



Figs. 57–62. ***Eumenes lepeleterii*** **var.** ***hottentottus*** **(Saussure).**

Fig. 57. Head, thorax, and two basal abdominal segments in profile, ♀. Fig. 58. Antenna, ♂. Fig. 59. Terminal joints of antenna, ♂. Fig. 60. Antenna, ♀. Fig. 61. First abdominal tergite from above, ♀. Fig. 62. Head in front, ♀.

Widely distributed on the African continent, from Senegal and the White Nile to the Cape; found also on Madagascar and the Seychelles, in Southern Arabia and on Sokotra, in Egypt, Syria, and on Cyprus (Fig. 63). *E. lepeleterii* is, however, not uniformly distributed over the African continent; it is chiefly an East African species. It is always very rare in the West African forest region, preferring the open savannahs. It would be interesting to map out the distribution of the different color varieties in a manner similar to that done for *E. maxillosus*, but the available information is insufficient. It may be noticed that, out of the nine varieties, four have been recorded from the West African subregion, only two of which were found in the forest region; four exist in East Africa; and three are restricted to the Malagassy subregion.

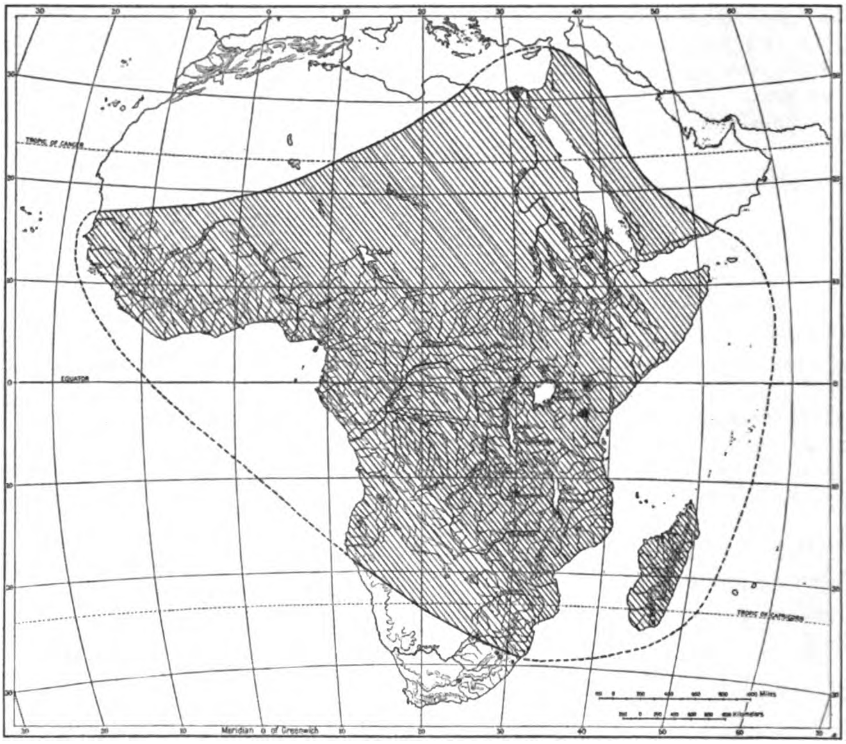


Fig. 63. Distribution of *Eumenes lepeleterii* and its color varieties.

Synoptical Table of the Color Varieties of *E. lepeleterii* Saussure

(Varieties *alluaudi*, *guerini*, *concinnus*, *asinus*, *tessmanni*, and *pensilis* are included after the descriptions of J. Pérez, H. de Saussure, and A. von Schulthess, since I have seen no specimens of these forms).

1. Head, thorax and abdominal petiole bright orange-yellow; the vertex, mesonotum, and abdomen behind the petiole, black. Wings dark brown with purplish effulgence..*alluaudi* (J. Pérez).

   Body not with black and bright orange marks as indicated above. Wings dark purplish-brown or subhyaline, often with golden-yellowish tinge......2.

2. Abdomen without yellow or yellowish-white markings, black or ferruginous-red and black..3.

   Abdomen more or less abundantly marked with yellow or whitish-yellow, at least on the petiole. Wings subhyaline, more or less tinged with golden-yellow..5.

3. Wings dark brown with purplish effulgence. Body almost entirely black, with a few ferruginous spots on head, thorax, legs and petiole. A few yellow spots on the head. (Very similar to typical *E. maxillosus*)...*hottentottus* (Saussure).
   Wings subhyaline with feeble yellowish tinge............................4.

4. Body almost entirely black, with a few ferruginous spots on head, thorax, legs, petiole, and also on the apical margins of the terminal tergites. Head and thorax with a few yellowish-white spots.
   guerini (Saussure) (= *E. sakalava* Saussure).
   Body for the most part ferruginous-red, more or less darkened, with more or less abundant black markings, very often with a distinct black cross on the second tergite. Only the clypeus and markings on the head in the ♂ yellowish.
   concinnus (Saussure).

5. Yellowish markings very abundant on head, thorax, and abdomen; the tergites behind the petiole for the most part bright yellow with a well marked black cross, the branches of which run over the middle of the second tergite......6.
   Yellowish markings much more reduced, the abdomen only with a few markings on the petiole or on the two first tergites..............................7.

6. Mostly black and yellow, the ferruginous being much reduced; the cross on the abdomen black..........typical *lepeleterii* Saussure (= *E. granti* Kirby).
   Black ground color almost entirely replaced by ferruginous-red, the cross on the abdomen also of the same red color...................*asinus* (Saussure).

7. Black, with abundant ferruginous markings on head, thorax, and abdomen; the head, thorax, and the apex of first and second tergites, with a few reduced yellow spots..................................*stuhlmanni* A. v. Schulthess.
   Black, almost without ferruginous markings. Clypeus (in the ♂), frontal spot, external and internal orbites, pronotum, postscutellum, lateral spots on the propodeum, two small apical spots on the petiole, and legs externally, yellow.
   tessmanni A. v. Schulthess.
   Black, with rufous tinge. Postscutellum, petiole, and second tergite with a narrow ivory-white apical band.....................*pensilis* (Saussure).

Nothing seems to be known as to the life habits of this species.

14. **Eumenes lepeleterii** Saussure, typical form

The first described form, or typical *E. lepeleterii* Saussure, has a very striking coloration, being for the greater part bright yellow. The black is restricted to the upper side of the antennal scape and the extremity of the flagellum; the mesonotum; a transverse stripe between the scutellum and postscutellum; a longitudinal median stripe on the propodeum; the greater part of meso- and metapleura; and a broad cross on the second tergite, this cross extending over the apical half of the petiole and over the middle of the posterior segments. The ventral side of the abdomen is mostly black, without yellow markings. The following parts are ferruginous-red; the antennæ for the greater part; the mandibles; the tegulæ; the base of the petiole on its dorsal face and its apex on its ventral side; the two apical abdominal segments: and the legs, except for the front tibiæ and femora which are mostly yellow. The wings are suffused with golden-yellow, the radial cell having an effulgent purple spot. The color is nearly the same in both sexes.

This is the coloration found in 5 specimens (2 males and 3 females) from the Lower Congo region: Boma, Matadi (Belgian Congo), and Noki (Angola).

There is, in my opinion, hardly any difference between the typical *lepeleterii* Saussure and the form described and figured by Kirby under the name *Eumenes granti*. The amount of red on the petiole is very variable in specimens from the same locality.

15. **Eumenes lepeleterii** var. **hottentottus** (Saussure)

This is a melanistic variety, looking much like a typical *E. maxillosus* (de Geer); so much so, indeed, that very close examination is required to separate them. However, *hottentottus* never reaches the size of *maxillosus*, but small forms of the latter species are not uncommon. The insect is black, with a few indefinite, ferruginously tinged spots on head, antennæ, thorax, legs, abdominal petiole, and second segment. In the male, the yellow is much less extended on the head than in the *maxillosus* male, being restricted to the upper part of the clypeus and small spots under the insertion of the antennæ.

This variety is very abundant in South Africa (Cape Colony, Natal, Mozambique); it is very rare in the Congo basin, but has been recorded from the Cameroon.

Belgian Congo.— Boma, 4 ♂♂, June 1915; Stanleyville, 2 ♀♀, April 1915.

16. **Eumenes lepeleterii** var. **stuhlmanni** A. v. Schulthess

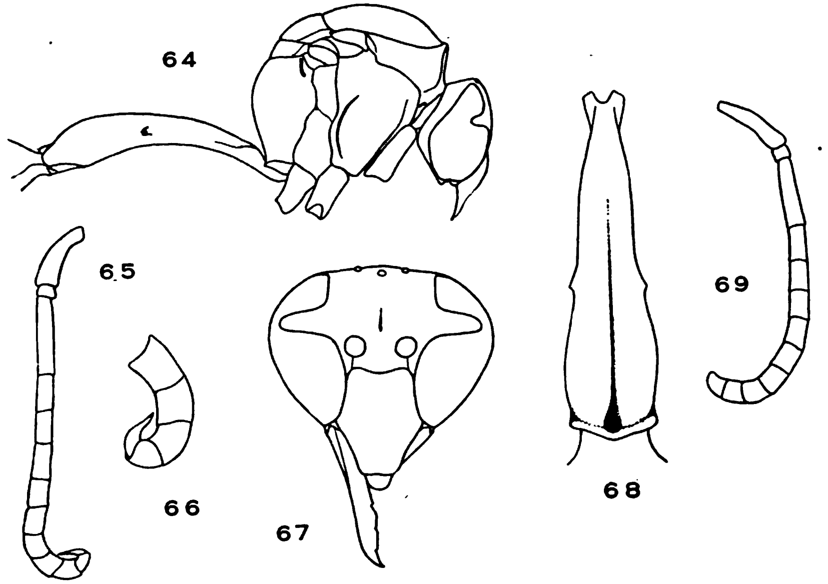
I have before me one male which I collected in the Semliki Valley (between Beni and Kasindi, north of Lake Albert Edward) and which has all the structural characters of *E. lepeleterii*. Its coloration is as follows:

Black; largely suffused with ferruginous on antennæ, mandibles, pronotum, tegulæ, mesopleura, scutellum, postscutellum, propodeum, legs, petiole, and base of the second tergite. The following parts are yellow: the clypeus; a broad spot on the front; the inner and outer margins of the eyes; the middle part of the pronotum; spots on the postscutellum and on the sides of the propodeum towards its apex; an elongate spot on each side at the apex of the petiole; an indefinite small marginal spot in the lateral edges of the second tergite; and the outer side of the front tibiæ. Wings slightly suffused with golden-yellow, the radial cell more purplish. Length (h. + th. + t. 1 + 2), 13 mm.

Apart from the presence of lateral yellow spots on the second tergite, instead of a continuous apical band, and from the more extensive ferruginous coloration of some parts of the body, this specimen agrees with the description given by A. von Schulthess[1] for his East African variety *stuhlmanni.* The yellow clypeus is a sexual difference.

Eumenes melanosomus Saussure

♀.— Head (Fig. 67), as seen in front, nearly as high as broad. Clypeus distinctly longer than broad; its terminal margin straight or slightly rounded, with curved, flattened edges. Front scarcely or not elevated between the antennæ and only with a feeble indication of a longitudinal groove. Thorax (Fig. 64) short, subglobular. Mesopleura with the suture of the epimerum obsolete, the episterna not divided by a median groove, with distinct epicnemia for the front legs, and furthermore with a strong and sharp carina in front of their hind margin, delimiting deep epicnemia for the middle legs.[2] Scutellum often with a fine, smooth, longitudinal carina



Figs. 64–69. *Eumenes melanosomus* var. *decipiens* (Kirby).

Fig. 64. Head, thorax, and first abdominal segment in profile, ♀. Fig. 65. Antenna, ♂. Fig. 66. Terminal joints of antenna, ♂. Fig. 67. Head in front, ♀. Fig. 68. First abdominal tergite from above, ♀. Fig. 69. Antenna, ♀.

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[1] Soc. entomol., XXV, 1910, p. 18.

[2] This carina is correctly described by W. A. Schulz, Spolia Hymenopterologica, 1906, p. 318, for *E. melanosomus* var. *decipiens* Kirby (= *E. moseri* Schulz).

on its anterior half. Abdominal petiole (Figs. 64 and 68) strongly curved; very slender; much longer than the thorax; gradually widening from its base to its apex; its stigmata very slightly projecting laterally in the middle of its length; upper surface minutely punctate, flattened, with a longitudinal median groove which is very conspicuous towards its apex and disappears gradually towards its middle; about four times as long as broad at its apex. Second abdominal segment moderately inflated, narrowed towards its base, which is only slightly narrower than the apex of the petiole; its hind margin on the dorsal face slightly depressed and impunctate; second abdominal sternite moderately convex. Antennæ (Fig. 69) slender; scarcely inflated towards their apex; much longer than thorax and head together; all their joints distinctly longer than broad.

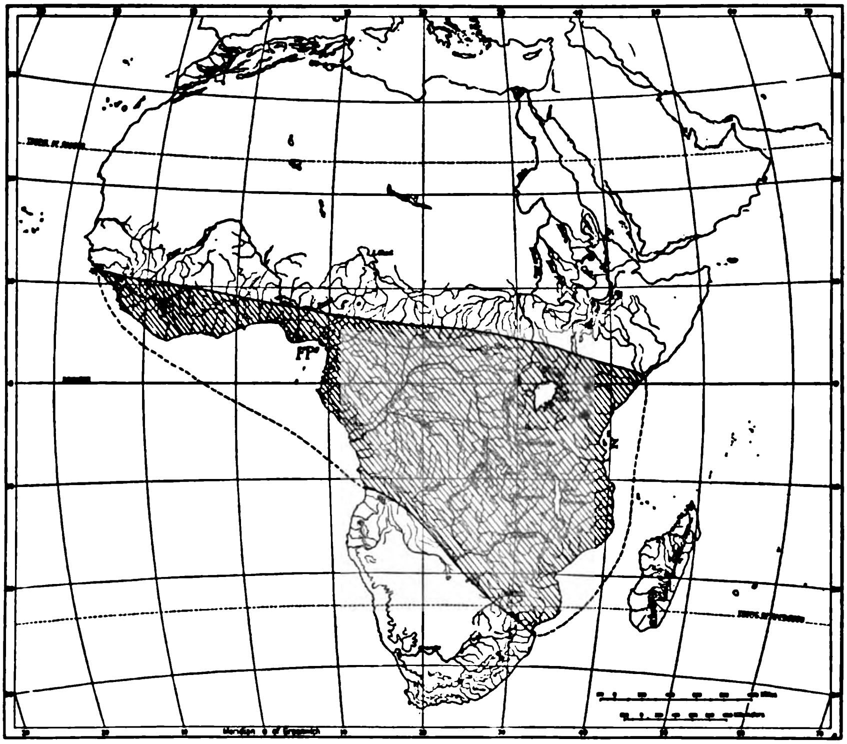

Fig. 70. Distribution of *Eumenes melanosomus* and its color varieties.

Length (h. + th. + t. 1 + 2), 13 to 19 mm.

♂.— Antennæ (Fig. 65) very slender; not moniliform; their terminal joint (Fig. 66) unguiform, very short, feebly curved on its middle, its basal half very broad, suddenly narrowed in a terminal sharp spine; when folded against the under side of the flagellum the apex of this hook-like thirteenth joint scarcely reaches over the middle of the eleventh joint, which presents no trace of a pit to receive it. Apical or seventh abdominal sternite flat, without any trace of longitudinal groove. The remainder as in the female.

Length (h. + th + t. 1 + 2), 9.5 to 12 mm.

Eumenes melanosomus presents numerous color variations and occurs throughout tropical Africa from Sierra Leone to Angola and from Mt. Kilimanjaro to Lourenzo Marques; it is also found on Zanzibar and Fernando Po (Fig. 70). The species was originally described from specimens in the Museum of Paris, labelled "Java," but none of its forms are known at the present time outside the Ethiopian region.

The following key will aid only in arranging the color varieties; there are numerous intermediates between them; in fact some of the forms (e. g., *distinctus* and *æthiopicus*) intergrade.

Key to the Color Varieties of *E. melanosomus* Saussure

1. Body chiefly black, with a few ferruginous spots on head, thorax, petiole, legs, and sometimes on the second abdominal segment; yellow markings very small and pale, nearly white. Wings uniformly smoky or dark brown....2.
   Body black and ferruginous-red, with abundant bright yellow markings. Wings subhyaline, with golden-yellowish tinge..............................4.
2. No yellow or white markings at all. Black, with very little ferruginous color on head, thorax, and petiole. Wings dark brown, with purplish effulgence. *aterrimus* A. v. Schulthess.
   At least the apex of the first tergite (petiole) or the propodeum with a yellowish or white spot. Wings smoky.......................................3.
3. Abdomen black with a very narrow yellowish-white band at the apex of tergite 1 or of tergites 1 and 2, often interrupted in the middle on the second tergite. Thorax without white or yellow markings....typical *melanosomus* Saussure.
   Like the preceding, but the yellowish-white markings are found on the thorax also, though variable in extension (at least two spots on the propodeum; often also markings on pronotum, postscutellum, and scutellum). Legs and head also marked with pale yellow....................*decipiens* (Kirby).
4. Abdomen without yellow markings. Body black, extensively ferruginous-red on head, thorax, and the two basal abdominal segments. Head with a few yellow markings; propodeum with two large yellow spots..*longirostris* (Gerstæcker).
   Abdomen more or less marked with yellow............................5.
5. Abdomen behind the petiole nearly entirely yellow on its dorsal face, except for a black cross with branches running over the middle of the second tergite. Very much like typical *E. lepeletierii*[1]............*affinis* A. v. Schulthess.
   Abdomen only with reduced yellow markings..........................6.
6. Abdomen only with two yellow spots on the apical margin of the second tergite. Thorax and head, however, very richly marked with yellow. *æthiopicus* (Saussure).

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[1] After A. v. Schulthess. I have not seen specimens of this form.

Most of the tergites of the abdomen with yellow apical spots; two spots of the same color on the petiole and often a spot on each side in the basal part of the second tergite.................................*distinctus* (Saussure).

The ethology of this species has not been studied.

17. **Eumenes melanosomus** Saussure, typical form

The first described form, or typical *melanosomus* Saussure, has the thorax and head black, with a few ferruginous spots. Abdomen black; its first, or first and second tergite with a very narrow pale yellow apical band, which on the second tergite is often interrupted in the middle. This form was found in Spanish Guinea and is, according to A. v. Schulthess, distributed throughout Equatorial Africa.

Belgian Congo.— Only two females of the collection belong to the typical *melanosomus* Saussure. They were collected at Stanleyville and Gamangui.

18. **Eumenes melanosomus** var. **decipiens** (Kirby)

Much like the typical *melanosomus* Saussure as described above; being black, with rufous spots on head, thorax, antennæ, legs, and ventral side of the abdominal petiole, and having a narrow yellowish-white apical band on tergites one and two. In all of my specimens the band on the second tergite is broadly interrupted in the middle. The yellowish-white markings are found also on the thorax, their extension being, however, very variable; at least an indication of two lateral spots on the propodeum is always present; but some specimens may offer two or three transverse spots on the anterior margin of the pronotum, a transverse median line on the post-scutellum, and spots on the lateral margins of the scutellum. The legs are more or less extensively lined with yellowish-white, and the head presents a few spots of the same color: in the female, on the emargination and hind margin of the eyes; in the male, besides these, on part of the clypeus and on the front between the antennæ. The wings are uniformly smoky, somewhat darker with a purple effulgence in the median and radial cells.

This variety is apparently restricted to West Africa. It was known from Sierra Leone, Cameroon, Spanish Guinea, Fernando Po, and Gaboon.

Belgian Congo.— Apparently one of the common wasps. I have seen 16 ♀♀ and 11 ♂♂ from Banana, Malela, Thysville, Stanleyville, Akenge, Masisi, Lubutu, and Walikale.

19. **Eumenes melanosomus** var. **aterrimus** A. v. Schulthess

Like the typical *melanosomus* Saussure, but slightly larger. Pronotum and dorsulum distinctly, though feebly, punctate; black without any yellow markings, but with the following ferruginous parts: mandibles, clypeus, under side of antennæ, front and hind margin of the eyes, pronotum, anterior legs, and, furthermore, propodeum and abdominal petiole more or less extensively. The wings are dark violet as in *E. maxillosus*.[1]

It was found in Togo, Cameroon, Nyasa, and Zanzibar; also at the foot of Mt. Ruwenzori.

Belgian Congo.— I collected one female of this extreme melanistic form on Mt. Ruwenzori (valley of the Butagu River), May 22, 1914, at an altitude of 1900 m. The collection of the Congo Expedition includes 1 female and 1 male from Stanleyville, April 1915. The specimens from Stanleyville agree with von Schulthess' description; the female from Mt. Ruwenzori is darker black, the ferruginous coloration being restricted to the mandibles and a small spot in the emargination and on the hind margin of the eyes. This specimen is the most completely melanistic *Eumenes* I have seen thus far.

20. **Eumenes melanosomus** var. **longirostris** (Gerstæcker)

This form comes next to the var. *decipiens*, though it presents a greater extension of the ferruginous-red color, which covers a large part of the clypeus, antennæ, and mandibles, and nearly the whole of the thorax, legs, and abdominal petiole. The base and two lateral spots of the second tergite are of the same color. The petiole has a broad dorsal longitudinal black stripe. The mesonotum and various ill-defined spots on the sternum, pleura, propodeum, scutellum, and postscutellum are also black. Very conspicuous is a broad triangular yellow spot on each side of the propodeum, this yellow color being furthermore only found on the clypeus, the front between the antennæ, the emargination and hind margin of the eyes. The abdomen is destitute of any yellow markings. Wings uniformly subhyaline, with a slight yellowish tint.

Belgian Congo.— The description was made after one female which I collected at Kasonsero, in the valley of the Semliki River, near the southern end of Lake Albert. It does not agree completely with the original description of Gerstæcker, but this and the two following varieties are connected by numerous intermediate color variations, so that it seems useless to increase the number of existing names by describing the Semliki specimen as new.

The var. *longirostris* Gerstæcker was previously known from East Africa (Mozambique).

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[1] A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18.

21. **Eumenes melanosomus** var. **æthiopicus** (Saussure)

♀ and ♂.— Black. Clypeus, front between the antennæ, a spot in the emargination and a line on the hind margin of the eyes, the whole of the pronotum, the greater part of scutellum and postscutellum, a very broad triangular spot on each side of the propodeum, a small spot on the mesopleura beneath the insertion of the wings, a terminal spot on each side of the second abdominal tergite, and a line on the outside of all the tibiæ and of the front femora, deep yellow. Antennæ, mandibles, ill-defined spots on the sides of the thorax, legs for the greater part, and under side of the abdominal petiole, ferruginous. Wings subhyaline, slightly tinged with yellow.

This variety seems to be peculiar to the Congo and Gaboon.

Belgian Congo.— Boma, Thysville, Coquilhatville, and Stanleyville. I have seen 15 ♀ ♀ and 3 ♂ ♂.

22. **Eumenes melanosomus** var. **distinctus** (Saussure)

This variety comes very near the variety *æthiopicus* (Saussure), but the yellow markings are more developed, extending on the head over the mandibles and under side of the antennal scape, and on the thorax over the greater part of the mesopleura. On the abdomen there are lateral preapical spots on the segments, even behind the second, their number being variable; the second tergite always bears a supplementary lateral yellow spot in its anterior half; one may even find a small yellow dorsal stripe on each side of the abdominal petiole.

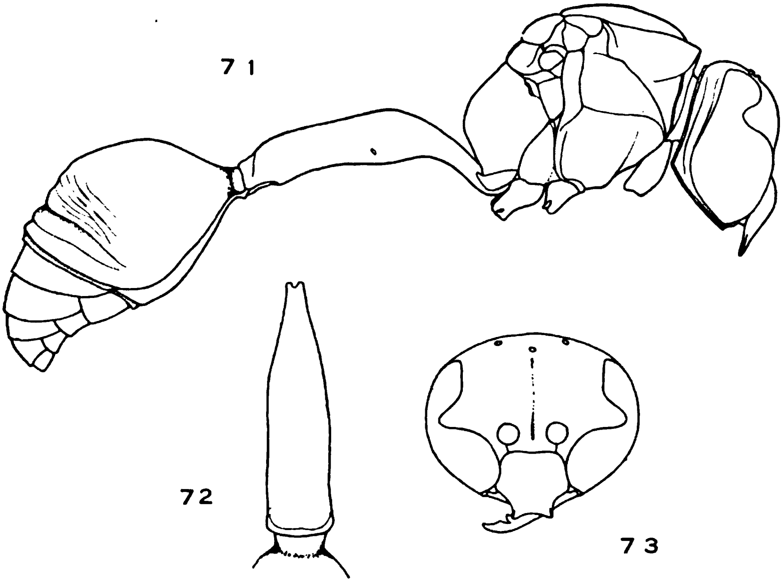
Belgian Congo.— This variety is especially abundant in the Lower Congo district: Banana, Malela, Boma, and Kinshasa. But it is found further inland also, for I have seen specimens from Stanleyville, Yakuluku, and the Semliki River (between Beni and Kasindi). The collection includes 3 ♀ ♀ and 20 ♂ ♂.

One often sees specimens which are intermediate between this and the preceding variety. They have a supplementary lateral yellow spot on the basal half of the second tergite; but the third and following segments have no yellow markings at all. They are found, together with typical *distinctus* (Saussure), at the mouth of the Congo River.

23. **Eumenes langi**, new species

♀.— Head (Fig. 73), as seen in front, distinctly broader than high. Clypeus strongly convex in its median upper part, broadly depressed near its anterior margin; moderately elongate below the insertion of the mandibles and very broadly truncate at its apex; its apical margin slightly emarginate into a broad curve, with distinctly projecting, rounded lateral edges. Vertex without fovea; distinctly swollen in front of the ocelli; with a shallow median longitudinal depression running from the anterior ocellus to the front between the insertion of the antennæ. Inner margins of the eyes nearly twice as far from each other on the vertex as on the clypeus. Posterior ocelli more remote from each other than from the inner margin of the eyes. Vertex and temples margined behind by a continuous, sharp carina. Upper part of the temples feebly swollen behind the eyes. Mandibles elongate, beak-like; however, much shorter than the great ocular diameter, their inner margin with three, deeply cut, blunt teeth before the apex. Antennæ short, their flagellum strongly swollen towards its apical half, their joints 7 to 11 distinctly broader than long.

Thorax (Fig. 71) moderately long; subglobular; without the propodeum as long as broad or high. Pronotum broadly truncate in front, without anterior raised carina on its middle. Mesonotum with a distinct median depressed line on its anterior half, and traces of parapsidal furrows on its posterior part above the tegulæ. Scutellum well developed, convexly pillow-shaped, without carinæ or raised lines.



Figs. 71–73. *Eumenes langi*, new species.

Fig. 71. Head, thorax, and abdomen in profile, ♀. Fig. 72. First abdominal tergite from above, ♀. Fig. 73. Head in front, ♀.

Postscutellum flat, sloping. Mesopleura with a distinct suture separating the epimera from the episterna, the latter also divided in two parts by an oblique depressed line; no raised carina in front of the epicnemia of the middle legs. Propodeum moderately long; deeply grooved on the middle line behind the postscutellum, the groove expanding into a small concavity above the insertion of the abdomen. Sides of the propodeum broadly rounded, without carinæ or projecting angles.

Legs normal; middle tibiæ with one apical spur; claws deeply bifid at the apex. Wing venation of the ordinary *Eumenes* type.

Abdomen (Fig. 71) elongate and slender; of distinct *Eumenes* shape; its first segment forming a long and narrow petiole; the rest of the abdomen much inflated. Abdominal petiole (Fig. 72) long and slender, gradually broadened and thickened in its basal third, where it is distinctly curved in profile; its apical two-thirds with nearly parallel sides, slightly flattened on its dorsal face, but without any indication of a longitudinal groove; its stigmata not projecting; about as long as head and thorax (including propodeum) together and nearly four times as long as its apical width. Second abdominal segment comparatively long, scarcely shorter than the petiole, constricted at its base into a distinct neck, which, however, is only slightly narrower than the apex of the petiole. Apical margin of the second segment duplicate on its dorsal as well as on its ventral side; the extreme margin forms a very thin, more or less membranaceous, narrow, and smooth blade or lamella; in front of this lamella the integument is swollen into a continuous, blunt, transverse ridge; a deep groove presenting a row of strong punctures, separates the foliaceous from the swollen part. The second tergite presents, furthermore, in its posterior half, a series of fine, irregular, transverse rimples, the rimpled zone being limited behind by a deep transverse groove situated about the posterior fifth of the tergite. Second sternite gradually flattened towards its base.

Punctation very dense and coarse on head and thorax; clypeus almost smooth, except for a very few punctures on its middle; tegulæ smooth and shining. Very strong, but remote, punctures are scattered over the whole of the dorsal face of the petiole. Second tergite densely covered with moderately strong punctures, which are much finer than on the thorax; its sternite scarcely punctate. The following segments nearly impunctate.

Pubescence almost lacking, except on the clypeus which is feebly grayish pilose; the body very shining.

Black. The terminal joints of the antennæ beneath, the apical half of the mandibles, the front legs and the apical abdominal segment faintly tinged with ferruginous. A small dot on the front between the antennæ, a narrow, incomplete band along the hind margin of the petiole, a preapical narrow band on the second tergite (on the swollen ridge), an indication of a similar band on the second sternite, and ill-defined spots on the front tibiæ and front femora, yellowish white. Wings uniformly smoky; tegulæ black.

Length (h. + th. + t. 1 + 2), 8 mm.

Belgian Congo.— A single ♀ from Boma, June 15, 1915 (Lang and Chapin Coll.).

This small species belongs to the group of *Eumenes* with duplicate posterior margin of the second segment (*Eumenidion* A. v. Schulthess — Type: *E. coarctatus* [Linné]), a group which includes many other forms from the Ethiopian region (*E. lucasius* Saussure, *E. acuminatus* Saussure, *E. braunsianus* A. v. Schulthess, *E. femoratus* A. v. Schulthess, *E. fülleborniamus* A. v. Schulthess, *E. capensis* A. v. Schulthess, *E. peringeyanus* A. v. Schulthess, *E. sulcigaster* Gribodo). None of the previously published descriptions mention the peculiarly rimpled sculpture of the second abdominal tergite, so that I venture to describe it as new. It apparently comes near *E. lucasius* Saussure, a species which, unfortunately, I was unable to see.

Pachymenes Saussure

Generic characters.— Clypeus piriform, truncate or bidentate at its apex. Mandibles lengthened, crossing each other in an X, dentate or lobate along their inner margin. Mouth parts as in *Eumenes, Odynerus,* and *Nortonia.* Shape of the abdomen intermediate between that of *Eumenes* and that of *Odynerus* subgenus *Rygchium:* its first segment funnel-shaped, subcampanulate; the first tergite without any trace of transverse carina; the abdomen, as a rule, depressed. Genotype: *Pachymenes sericeus* Saussure, 1852. (Compare the discussion of the genus *Nortonia,* p. 90).

This genus is distributed in the warmer regions of the world; I do not know of any Palearctic species which can be included in it. The North American *Odynerus symmorphus* Saussure and *Nortonia tolteca* Saussure must be placed here, and the same is true for most of the species of *Nortonia* described by A. v. Schulthess.[1] For similar reasons *Eudiscœlius* Friese[2] and *Euchalcomenes* Turner[3] become synonyms of *Pachymenes* Saussure.

In the supplementary part of his Monograph,[4] H. de Saussure has given the name *Pseudochilus* to his first division of the genus *Pterochilus* Klug. This division was characterized as follows:[5] "Palpes labiaux grands, mais nullement plumeux, portant seulement des poils roides. Mandibules courtes. Abdomen pédicellé, le premier segment linéaire à sa base, fortement élargi et déprimé en arrière." This group can hardly be separated from *Pachymenes* Saussure. The only described species, *Pt. glabripalpis* Saussure, however, is said to have three-jointed labial palpi[6]; but this character loses much of its value when we read in the "Supplément," 1854, p. 321, that in *Pterochilus* the labial palpi very often present a rudimentary fourth joint. As I was unable to study this species, I think it best not to unite at the present time *Pachymenes* with *Pseudochilus.*

Ethology. The life history is only partly known for the South American species, *Pachymenes sericeus* Saussure,[7] *P. ater* Saussure,[8] and *P. pilifrons* (Kohl),[9] which build mud nests similar to those of *Eumenes.* One of the species, *P. ater,* was found to feed its larvæ on caterpillars.

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[1] Verh. k. k. zool. bot. Ges. Wien, LIII, 1903, pp. 361–365; Zeitschr. f. syst. Hym. u. Dipt., IV, 1904, pp. 270–283.

[2] Zeitschr. f. syst. Hym. u. Dipt., IV, 1904, p. 16.

[3] Trans. Ent. Soc. London, 1908, p. 90.

[4] Et. fam. Vesp., III, Masar., 1854, p. 321.

[5] Et. fam. Vesp., I, Eum., 1852, p. 238.

[6] H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 239.

[7] E. Strand, Zool. Jahrb. Abt. f. Syst., XXXIII, 1912, pp. 307–308; G. Mantero, Ann. Mus. civ. Genova, (3), IV, 1910, pp. 539–540, Pl. IV, figs. 1 and 1 bis.

[8] Bertoni, An. Mus. Buenos Aires, (3), XV, 1912, pp. 109–110.

[9] F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 240.

Key to the Congo Species of *Pachymenes*

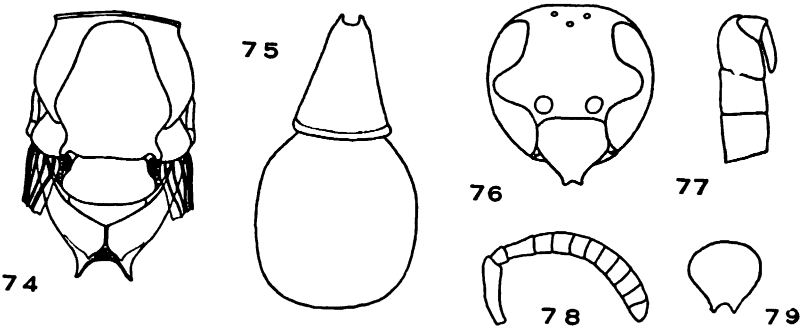
Propodeum with its lateral angles projecting on either side of the middle line into tubercles or small teeth, its dorsal areas rugosely reticulate. Punctation on vertex and dorsal face of the thorax moderately strong and very dense. Terminal joint of ♂ antennæ (Fig. 77) slender, nearly reaching to the base of the eleventh joint. *P. congensis*, new species.

Propodeum broadly and convexly rounded behind, without projecting angles, its dorsal areas with scattered strong punctures. Punctation on vertex and dorsal face of the thorax comparatively stronger, but more remote. Terminal joint of ♂ antennæ (Fig. 80) very short and small, not reaching to half way the length of the eleventh joint.......................................*P. astutus* F. Kohl.

24. **Pachymenes congensis**, new species

Plate I, Figure 2

♀.— Head (Fig. 76) subcircular, slightly higher than broad. Clypeus piriform; scarcely broader than long; much narrowed from the base of the mandibles towards its terminal margin, which is slightly broader than the quarter of the total width of the clypeus. This apical margin of the clypeus is feebly arcuate-emarginate on its middle, its projecting lateral angles being broadly rounded; surface of the clypeus moderately convex, flattened in the middle in its under half, without carinæ. Vertex normally developed, without depressed groove behind the ocelli; distance between the eyes on the vertex one and one-fifth that on the clypeus; lateral ocelli as far from each other as from the inner margin of the eyes. Temples gradually broadening from the base of the mandibles towards the vertex, margined by a narrow raised carina which stops behind the upper angle of the eyes. Mandibles beak-like, about as long as the great ocular diameter, terminating in a curved sharp apex, their inner



Figs. 74–79. *Pachymenes congensis*, **new species.**

Fig. 74. Thorax from above, ♀. Fig. 75. Two basal abdominal tergites from above, ♀. Fig. 76. Head in front, ♀. Fig. 77. Terminal joints of antenna, ♂. Fig. 78. Antenna, ♀. Fig. 79. Clypeus, ♂.

margin armed with four broad obtuse teeth. No frontal carina, the space between the insertion of the antennæ scarcely raised. Antennæ (Fig. 78) inserted below the middle of the head; their scape slender but feebly curved, its length only one-third that of the flagellum; their flagellum moderately swollen towards its apex. Second joint of the flagellum distinctly shorter than joints 3 + 4; about the length of joints 5 + 6.

Thorax (Fig. 74), as seen from above, one and one-half times as long as broad. Pronotum scarcely bordered anteriorly by a slightly raised carina, which produces on the sides feeble, bluntly projecting angles; propleura with a strong vertical carina; a feebler ridge limits the epicnemia of the front legs on the mesopleura. No parapsidal furrows visible on the mesonotum. Scutellum and postscutellum flat, normal; scutellum transverse, rectangular; postscutellum slightly sloping, subtriangular. Propodeum short; as seen from above, distinctly developed behind the postscutellum; broadly rounded at its sides, with a deep, but narrow, median groove starting on the hind margin of the postscutellum; its lateral angles projecting behind in a distinct tubercle or in a bluntly rounded tooth, from which a short raised carina (superior ridge of the propodeum) runs towards the median groove; its lateral and inferior ridges rounded, without carinæ. Concavity of the propodeum, behind its lateral angles, short and narrowed; very deeply excavated; divided by a raised median longitudinal ridge. The inferior part of the propodeum near the insertion of the abdomen presents on each side a very long and sharp, discolored tooth directed posteriorly. Legs and wings normal.

Abdomen (Fig. 75) elongate and narrow; its first segment nearly petiole-shaped, gradually broadening from its base to its apex. Its first tergite funnel-shaped; only slightly longer than broad at its apex; without transverse carina; scarcely depressed before its terminal margin; its lateral angles broadly rounded, not projecting. Second segment spheroidal; slightly depressed above; scarcely longer than broad; about one and one-third times as long as the first; its hind margin not depressed, though decolorate and lamelliform; second sternite strongly swollen, convexly rounded towards its base. Segments 1 + 2 distinctly longer than the thorax, as seen from above.

Punctation on head and thorax moderately strong and dense, finer on the front. The clypeus presents only a very few scattered minute punctures; it is very finely and densely chagreened all over. Dorsal areas of the propodeum densely and rugosely reticulate. Punctation of the abdomen much finer and more remote than on the thorax, especially on the first tergite.

Black, with the following white markings: a short transverse stripe in the midst of the base of the clypeus; a minute punctiform spot in the emargination and behind the upper angle of the eyes; a broad stripe on the under side of the scape; a short interrupted band on the median part of the pronotum; the posterior half of the tegulæ and the posttegulæ; the anterior half of the postscutellum; a narrow terminal fascia on tergite 1 and a broader one on tergite and sternite 2; a small spot in the middle of the hind margin of tergite 5, and a larger one on tergite 6; a broad stripe along the outside of the tibiæ; and a spot near the apex of the front and middle femora. Apex of mandibles and under side of flagellum ferruginous. Wings hyaline, with a smoky-purplish apex.

Length (h. + th. + t. 1 + 2), 6 to 7.5 mm.

♂.— Apart from sexual characters, much like the female. The clypeus (Fig. 79) is more strongly emarginate, its lateral teeth therefore more projecting. Antennæ elongate, with a slender, straight, hook-like terminal joint (Fig. 77), which scarcely reaches the base of the eleventh joint when folded on the under side. White markings more extended on the base of the clypeus and on the legs, the tarsi being nearly entirely of that color; a small white spot in the middle of the end margin of the tergites 4 to 6 or 5 and 6.

Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.

Belgian Congo.— This species is apparently common in the Lower Congo. The holotype is a female from Banana, September 1915 (Lang and Chapin Coll.); the allotype a male from the same locality. I have seen other specimens (paratypes) from Boma (1 ♀, 1 ♂) and Zambi (2 ♂♂), all collected in June, and from Stanleyville (2 ♀♀), April 1915.

P. congensis can be recognized *inter alia* by the shape of the clypeus, by the projecting lateral angles of the propodeum, and the terminal joints of the male antennæ. It comes near *P. astutus* (Kohl).

25. **Pachymenes astutus** (F. Kohl)

The female of this species has been completely described and figured by F. Kohl. The chief differences between it and *P. congensis*, in this sex, consist in the shape of the propodeum, which is broadly rounded behind when seen from above and, in profile, convexly curved from the post-scutellum to the insertion of the abdomen. The dorsal areas of the propodeum present only scattered strong punctures, and no reticulation; the punctation on vertex and dorsal face of the thorax is stronger than in *P. congensis*, but more remote.

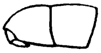


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Fig. 80. *Pachymenes astutus* (Kohl), terminal joints of antenna, ♂.

♂.— Very similar to the female, the clypeus more deeply emarginate. Antennæ slender, their two terminal joints (Fig. 80) very small, their apical joint narrow, pointed and very short, not reaching half way the length of the eleventh joint when folded beneath the latter.

Length (h. + th. + t. 1 + 2), 7.5 mm.

Belgian Congo.— Stanleyville, 3 ♀♀ and 2 ♂♂, April 1915 (Lang and Chapin Coll.).

It was originally described from Cape Colony.

Nortonia Saussure

This genus has been variously understood by different authors and, since it is apparently well represented in the Ethiopian region, it will be useful to discuss its characters and relationship. To avoid confusion, we must go back to the original description, which was published by H. de

Saussure in the Stettiner entomologische Zeitung, XXX, 1869, p. 53: "Caractères des *Eumenes*, mais le pétiole en entonnoir, fortement évasé; la base linéaire courte ou nulle. Formes des *Montezumia;* bouche comme chez les *Eumenes;* (type: *Odynerus intermedius* Sauss.)." This description, although very short, is sufficient in as much as it indicates the genotype. This is a well-known species distributed throughout southeastern Europe, Asia Minor, and North Africa. I have seen no specimens of it; yet I may remark that F. D. Morice's statement[1] that *O. intermedius* Saussure "has no trace of the transverse crest near the petiole" is wrong. H. de Saussure, it is true, includes the species in his "sous-genre *Leionotus*" of *Odynerus*, characterized by the "premier segment de l'abdomen sans suture transversale"; in the description,[2] however, it is said that the first tergite has "une saillie dorsale en dessus de sa base." Moreover, it has been shown[3] that *Eumenes laminata* Kriechbaumer is a synonym of *Nortonia intermedia* (Saussure), the presence of a raised, transverse carina on the first tergite being one of the chief peculiarities of that *Eumenes*.[4]

A more complete generic description of *Nortonia* has been given by H. de Saussure in 1875:[5]

> Mandibles lengthened, dentate or lobate. Lip and jaws lengthened; labial palpi composed of four articles, the first three armed with long hairs; maxillary palpi composed of six articles. Clypeus piriform, truncate or emarginate. Abdomen having its first segment retracted, funnel-shaped or subcampanulate, sub-bidentate in the middle. Metathorax short, convex, its groove shallow, flattened behind, its lateral edges distinct. The remainder as in *Montezumia*. This type establishes the transition of *Odynerus* to *Eumenes*. The organs of the mouth are almost the same as in *Eumenes* and *Odynerus*, but the body has the form to which it inclines in *Montezumia*, the first segment being funnel-shaped, not sessile, as in *Odynerus*, but not contracted into a petiole as in *Eumenes*.

Saussure includes, then, in this genus, besides the palearctic *N. intermedia*, the North American species *N. symmorpha* Saussure and *N. tolteca* Saussure, each of which has no transverse carina on the first tergite.

In Grandidier's Histoire physique, naturelle et politique de Madagascar, XX, pt. 1, Hym., 1890, p. 156, H. de Saussure gives only an abridged translation of his description of 1875:

> Mandibules allongées, dentées ou lobées.— Labium et maxilles allongés. Palpes labiaux composés de quatre articles, palpes maxillaires de six. Abdomen plus ou

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[1] Ann. Mag. Nat. Hist., (7), XII, 1903, p. 614.

[2] Et. fam. Vesp., I, Eum., 1852, p. 156.

[3] F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 240.

[4] Kriechbaumer, Ent. Nachr., V, 1879, p. 59; Ed. André, Spéc. des Hym. Eur. et Algér., II, 1886, pp. 870 and 871.

[5] Syn. of Amer. Wasps, Smithsonian Misc. Coll., No. 254, p. 139.

moins fusiforme, ayant son premier segment rétréci à sa base, en entonnoir ou campanulé ou subpétiolé. Métathorax arrondi, un peu excavé au milieu, ses arêtes latérales seules un peu vives. Ce genre forme une sorte de passage des *Odynerus* aux *Eumenes* en ce sens que le premier segment de l'abdomen se rétrécit en forme d'entonnoir et tend à devenir pétiolé. L'habitus général est celui des insectes du genre *Montezumia*. Les caractères de la bouche et des ailes sont les mêmes que chez les *Odynerus*. Types du genre: *N. intermedia* Sauss. et *N. symmorpha* Sauss.

The newly described form, *N. schulthessiana* Saussure (*op. cit.* p. 157; Pl. XVII, fig. 8) shows no important differences from the species previously placed by Saussure in *Nortonia*, but it has no transverse carina on the first tergite.

From the preceding remarks it appears that *Nortonia*, as described by Saussure, belongs to our subfamily Eumeninæ, characterized by the elongated and beak-like mandibles, and would form a true link between *Eumenes* and *Odynerus*. The mouth parts are constructed on the same plan as in these two genera. In the shape of the abdomen, *Nortonia* is intermediate between both: its first abdominal segment is narrowed, funnel-shaped or subcampanulate. Its first tergite may or may not bear a transverse raised carina; this last character was never included in the generic diagnosis. Although the genotype possesses the carina, both H. de Saussure and A. von Schulthess have indifferently included in the genus species which do or do not present this peculiarity.

We come now, however, to the delicate problem of separating *Nortonia* Saussure from *Pachymenes* Saussure. The latter has been described as a genus in 1852[1] in the following way:

> Lèvre et mâchoires comme dans la première division du genre *Eumenes*. Premier article des palpes maxillaires renflé. Mandibules très longues, grêles, un peu crochues au bout et armées de dents arrondies et tranchantes, ne formant pas un bec par leur réunion, mais se croisant en X. Tête plate. Chaperon presque aussi large que long, et terminé par deux petites dents. Yeux allongés, ne couvrant pas en entier les parties latérales de la tête; leur échancrure triangulaire. Antennes presque filiformes, insérees au milieu de la hauteur de la tête. Abdomen pédicellé, en forme de pétiole médiocrement allongé, dépourvu d'épines. Pattes postérieures atteignant ou dépassant l'extrémité de l'abdomen. Ailes très longues, arrondies au bout. Deuxième cellule cubitale variable pour la forme, son bord externe simplement arqué.

The author indicates no type, but describes five species, all from America. Ashmead[2] designates as genotype the first described of these species, *Pachymenes sericeus* Saussure, and this must be accepted; the same writer states that in *Pachymenes* (*op. cit.*, p. 207) the mandibles are bidentate at the apex, whereas in *Eumenes* Fabricius they are said to be quadridentate; but I do not believe that this is true. I was not able to study the genotype, but in a related species, *Pachymenes pallipes* Saussure, the mandibles do not seem to be different in this respect from those of the true *Eumenes*. In a later work, H. de Saussure[1] drops *Pachymenes* as distinct genus and Zavattari, in his revision of neotropical solitary wasps,[2] follows this procedure.

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[1] Et. fam. Vesp., I, Eumén., p. 73.

[2] Canadian Entomologist, XXXIV, 1902, p. 208.

I am not well enough acquainted with American wasps to discuss at length the relationship of *Pachymenes*, but I wish to point out that this group seems very natural and may suggest the lines along which the social *Myrapetra* White (= *Polybia* Lepeletier *sensu stricto; Polybia* Ducke, 1910; genotype: *Myrapetra scutellaris* White) may have originated from eumenoid solitary wasps. None of the described species of *Pachymenes* possesses a transverse raised carina on the first tergite, whereas the authors describe for *Nortonia* species with and others without such a carina; there is, however, hardly any difference to be found between the species of *Nortonia* without transverse carina on the first tergite and those of *Pachymenes*.

The resulting difficulty can be solved in two different ways, one of them being to unite both genera; *Pachymenes* Saussure, the older name, will then claim priority. But we can also bring together in *Pachymenes* all the species without a transverse carina on the first tergite (as in its genotype, *P. sericeus* Saussure); whereas *Nortonia* Saussure would then include only the species with such a carina (as in its genotype, *Odynerus intermedius* Saussure). Although good reasons can be given for each of these two procedures, I prefer to follow, at least tentatively, the latter scheme. Both of these genera may be considered as links between *Eumenes* and odyneroid wasps. *Pachymenes* might suggest the transition between *Eumenes* and the *Rygchium* group of *Odynerus* and perhaps also some of the social genera: *Myrapetra* White, *Polybioides* R. du Buysson, *Ropalidia* Guérin, etc. Whereas *Nortonia* would show the connection between *Eumenes* and *Ancistrocerus*.

It seems to me very difficult to separate *Pachymenes* from *Nortonia* in any other way. Furthermore, forms intermediate between *Odynerus* or *Ancistrocerus* and *Eumenes* are found all over the world; which may be expected from the cosmopolitan distribution of these three genera.

As a conclusion, I may summarize the characters of *Nortonia* Saussure as follows: Clypeus piriform, truncate or emarginate at its apex. Mandibles lengthened, dentate or lobate along their inner margin, crossing each other in an X. Mouth parts as in *Eumenes* and *Odynerus*, the labial palpi 4-jointed, the maxillary palpi 6-jointed. Shape of the abdomen inter-

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[1] Syn. Am. Wasps, Smithsonian Misc. Coll., No. 254, 1875, p. 61.

[2] Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, 1912, p. 77.

mediate between that of *Eumenes* and that of *Odynerus;* its first segment much narrowed and subpetiolate at its base, funnel-shaped or subcampanulate behind, with a distinctly raised, transverse carina on its tergite. The second abdominal segment at least one and one-half times to twice as broad as the apical margin of the first. Genotype: *Odynerus intermedius* Saussure, 1852.

There has apparently been some confusion between *Labus* Saussure and *Nortonia* Saussure. We have discussed at length the true characters of *Labus* Saussure (p. 41); it may be enough to repeat here that *Labus* differs chiefly by its short, obliquely truncate mandibles, closing over each other under the clypeus, and belongs therefore to the Zethinæ. Several of the Ethiopian species, described as *Labus* by F. Kohl and G. Meade Waldo, must be excluded from that genus and transferred either to *Nortonia* Saussure or to *Pachymenes* Saussure. I have attempted to do this in the list of species at the end of this paper, but the conclusion reached may not always be satisfactory for I had to rely for most of the species merely on descriptions.

Nortonia, as characterized in this paper, includes 21 species which are mostly found in the Ethiopian region. The genus is well represented in tropical Africa, the collection made in the Belgian Congo containing 8 species. A large proportion of these (4) are here described as new; undoubtedly some of them will be found, later on, to be synonyms of forms previously named. However, only the species described by Kohl can be exactly recognized and this may be an excuse for giving a full account, with new names, of the morphology of the others, so that they can easily be compared with the types of older species.

Ethology. Apparently nothing has been published with regard to the life history of any species of *Nortonia,* as the genus is here restricted. It is interesting to note that several of the African forms (*N. braunsii* Kohl, *N. bisuturalis* Saussure, and *N. acarophila,* new species) are provided with acarid chambers and similar structures will certainly be discovered in other species.

Key to the Congo Species of *Nortonia*

The following key includes, besides the species which I have seen from the Belgian Congo, also *N. aberratica* Morice and *N. soror* Kohl. It is largely based on the excellent synoptic table of *Labus* and *Nortonia* published by Kohl.[1] Since a sharp distinction between *Nortonia* and *Ancistrocerus* does not exist, the student must also compare the key and descriptions of the *Ancistrocerus* from the Belgian Congo (pp. 113–114).

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[1] Denkschr. k. Akad. Wiss. Wien, math. naturw. Kl., 1907, LXXI, 1, pp. 240–248.

1. ♀ unknown. ♂.— First tergite of the abdomen with two transverse carinæ, the anterior very high, the posterior more like a suture; horizontal part of the first tergite behind the anterior carina about as long in its middle as broad at its apex, or scarcely longer. No acarid chamber in the abdomen. Second sternite with a row of longitudinal rimples on its basal neck. Anterior margin of the pronotum broadly rounded, not carinate. Terminal joint of the antennæ short, simple. Length (h. + th. + t. 1 + 2), 6 to 6.5 mm. *N. malelensis*, new species.

   First tergite of the abdomen with a single transverse carina; if with a trace of a posterior suture (as in some specimens of *N. bisuturalis*), then the other characters given above do not agree (*N. bisuturalis* has an acarid chamber at the base of the second tergite)....................................2.

2. ♂ unknown. ♀.— Propodeum with a deep, oval acarid chamber in front of its concavity. Clypeus deeply emarginate and bluntly bidentate at its apex. Anterior margin of the pronotum not carinate. Thorax elongate, much longer than broad. Postscutellum without transverse ridge. First tergite with its horizontal portion behind the transverse carina much longer than broad. Length (h. + th. + t. 1 + 2), 8 to 8.5 mm. *N. acarophila*, new species.

   Propodeum without a median acarid chamber above its concavity..........3.

3. Horizontal part of the first tergite (behind the transverse carina) not longer on its middle line than broad at its apical margin, or shorter (species forming the transition to *Ancistrocerus*)..4.

   Horizontal part of the first tergite much longer on its middle line than wide at its apex...7.

4. Scutellum and postscutellum with lateral, sharply raised teeth. Clypeus with broadly truncate apex; in the ♀ with three longitudinal carinæ, in the ♂ with two carinæ. First tergite comparatively short; its horizontal part about one and one-half times as broad at its apex as long on its middle line. No acarid chamber at the base of the first tergite. Length (h. + th. + t. 1 + 2), 7.5 to 8 mm..................................*N. tricarinulata*, new species.

   Scutellum and postscutellum unarmed or only with feeble lateral tubercles. Clypeus distinctly emarginate at its apex, without carinæ or with only two feeble lateral carinæ in the ♀. First abdominal tergite longer, its horizontal part about as long on its middle line as broad at its apex.................5.

5. Pronotum with sharply raised margin. (Acarid chamber absent?). Mesonotum shorter than its largest width. Thorax black, without red spots; however, postscutellum with yellow markings; legs extensively yellow. Total length, 8 to 9 mm.[1]............................*N. aberratica* Morice.

   Pronotum without a sharp margin, rounded anteriorly. A deep and broad acarid chamber at the base of the first tergite, opening towards the outside in a longitudinal median groove. Mesonotum as long as its largest width. The three penultimate segments of the abdomen punctate; second sternite vertically sloping towards its basal neck which presents a row of elongate rimples...6.

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[1] After the descriptions of Kohl and Maidl, since I have not seen that species.

6. Thorax black and red. Legs for the larger part ferruginous; first or first and second tergites with lateral ferruginous spots. First tergite more elongate in the ♂ than in the ♀, almost uniformly punctate over its horizontal face. Length (h. + th. + t. 1 + 2), 6.5 to 8.5 mm............*N. braunsii* Kohl.

Thorax black, with red and ferruginous markings. Legs ferruginous and black. Abdomen black with narrow yellow bands at the apex of the first tergite and of the second tergite and sternite, very seldom with a small ferruginous dot on the first tergite. Anterior part of the horizontal face of the first tergite smooth, almost without punctation. Length (h. + th. + t. 1 + 2), 6.5 to 8 mm......................................*N. bisuturalis* (Saussure).

7. Mesonotum distinctly longer on the middle line than its greatest width. Clypeus about as long as wide on its middle. Horizontal face of the first tergite about one and one-half times as long as it is wide at its apical margin; the entire first tergite as seen from above being nearly as long as the mesonotum. Pronotum with a minute, sharply raised anterior margin. Base of the second sternite without row of elongate rimples. No acarid chambers. Length (h. + th. + t. 1 + 2), 5 to 7 mm.....................*N. polydora* Kohl.

Mesonotum on its middle line as long as or shorter than its greatest width....8.

8. ♂.— Second sternite abruptly sloping towards its basal neck, which bears a row of elongate rimples. Anterior margin of the pronotum rounded, without carina. A deep and broad acarid chamber at the base of the first tergite. *N. braunsii* Kohl.

Second sternite gradually flattened or feebly sloping towards its basal neck, which possesses no row of elongate rimples. Pronotum with sharply raised anterior margin..9.

9. Horizontal face of first abdominal tergite about one and one-third times as long on its middle as broad at its apex; this apical margin very narrow, having scarcely one-third of the width of the second tergite. Thorax and first abdominal tergite very coarsely sculptured, almost reticulate; the punctation on the second tergite very distinct, but much finer and more remote than on the first. Thorax (not including the propodeum) not longer than its greatest width. Propodeum short, vertically sloping almost behind the postscutellum. Coloration deep black, shining; two narrow, elongate spots near the apex of the clypeus and two transverse spots at the apical margin of the first tergite, ivory-yellow. No acarid chambers. Length (h. + th. + t. 1 + 2), 8 to 10 mm...............................*N. morula* Kohl.

Thorax more elongate; not including the propodeum, distinctly longer than its greatest width. Horizontal face of the first tergite about one and one-third times as long on its middle as broad at its apex; the apical margin, however, comparatively broader than in *N. morula*, nearly half as wide as the second tergite...10.

10. ♀ unknown. ♂.— Postscutellum and part of the pronotum ferruginous; legs also ferruginous, without yellow markings. Total length, 9 to 11 mm.[1] *N. soror* Kohl.

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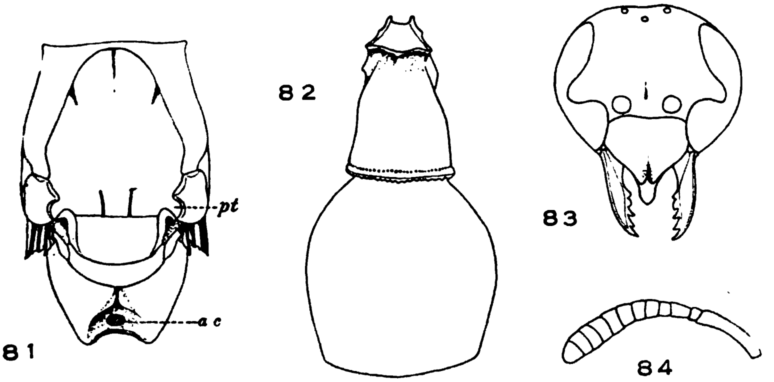
[1] After Kohl, since I have not seen that species.

♀ unknown. ♂.— Postscutellum and often the whole of the pronotum black. Legs partly yellow (on the basitarsus). No acarid chamber. Terminal hook-like joint of the antennæ small, narrow, scarcely reaching over the base of the eleventh joint. Length (h. + th. + t. 1 + 2), 6 mm.
N. fragosa Kohl.

26. **Nortonia acarophila,** new species.

♀.— Head (Fig. 83) subcircular. Clypeus transversely piriform; much broader than long; gradually narrowed from the base of the mandibles towards its apex, which is bluntly bidentate; its terminal, bidentate margin scarcely one-fifth of the total width of the clypeus. Surface of the clypeus uniformly swollen; distinctly depressed on its middle between the apical teeth; the teeth, however, not carinate. Vertex normally developed, with a shallow, broadly oval fovea behind the ocelli; distance between the eyes on the vertex one and one-third times that on the clypeus; posterior ocelli about as far from each other as from the eyes. Temples very narrow along the lower two-thirds of the outer ocular margin, then suddenly broadened, margined by a conspicuously raised carina, which is somewhat projecting on the upper broadened portion and ends far below the upper angle of the eyes; the vertex not margined behind. Mandibles beak-like, much shorter than the great ocular diameter, with a sharp curved apex, behind which the inner margin bears four strong teeth. Frontal carina, between the insertion of the antennæ, very feeble, flattened. Antennæ (Fig. 84) inserted below the middle of the head, their scape slender, about half the length of the flagellum. Flagellum strongly swollen towards its terminal half; its second joint as long as the third plus half of the fourth. From the fifth to the eleventh, the joints of the antennæ are distinctly broader than long.



Figs. 81–84. *Nortonia acarophila,* new species.

Fig. 81. Thorax from above, ♀: *ac,* entrance to the acarid chamber; *pt,* posttegula. Fig. 82. Two basal abdominal tergites from above, ♀. Fig. 83. Head in front, ♀. Fig. 84. Antenna, ♀.

Thorax (Fig. 81) elongate; as seen from above, one and one-half times as long (including the propodeum) as broad. Anterior margin of the pronotum sharp, but without distinct raised carina, with bluntly projecting lateral angles; from each lateral angle a strong carina descends on the propleuron. A feeble carina limits the epicnemia of the front legs on the mesopleura; this carina does not reach the middle of the mesosternum, but runs, gradually disappearing, towards the insertion of the middle coxæ. Parapsidal furrows only visible near the anterior and posterior margins of the mesonotum, broadly interrupted in the middle. Scutellum and postscutellum flat, normal; the scutellum rectangular, the postscutellum broadly rounded behind. The lateral part of the scutellum is sloping and presents near the tegulæ a deep but narrow fovea. Propodeum moderately long, with a well developed horizontal portion behind the postscutellum, and with a shallow median groove; the apex of the propodeum is truncate, very broadly emarginate, on each side with a bluntly rounded angle; posterior face of the propodeum with a small concavity; its superior ridges rounded; the lateral and inferior ridges only very faintly raised. The triangular space between the superior ridges and the upper margin of the posterior concavity of the propodeum is depressed into a broad groove, in the center of which is the elliptic aperture of an excavation; this chamber is inhabited by small acarids and is apparently very deep; usually one of the mites is found at its entrance. Legs and wings normal. Middle tibiæ with one apical spur.

Abdomen (Fig. 82) moderately elongate; its first segment much narrowed and very shortly subpetiolate at its base; first tergite nearly funnel-shaped, with a very strong, regular, continuous transverse carina at a short distance from its base; the part in front of the carina much narrowed and sloping; the part behind the carina distinctly longer than broad (about for one-quarter of the apical width of the tergite), very gradually broadening from the carina towards the apical margin; this apical margin only slightly raised and swollen, scarcely projecting on its sides. Lateral margin of the first tergite distinctly sinuate and angulate towards the transverse carina which projects as a strong, blunt tooth on each side. Terminal margin of the first tergite narrowly lamellate and decolorate; irregularly denticulate. Second segment spheroidal; somewhat flattened on its dorsal face; about as broad as long; only feebly constricted at its base, which, however, is distinctly narrower than the apex of the first tergite; this second tergite is only slightly longer than the first and its hind margin is feebly depressed, ending in a very narrow, membranaceous lamella. Second sternite normally swollen and broadly rounded towards its base, which has no row of deep and broad punctures. Segments 1 plus 2 much longer than the thorax, as seen from above.

Head and thorax uniformly covered with strong and dense punctation, which is slightly finer on the clypeus and more remote on the scutellum and mesopleura; punctation of the abdomen much finer and more remote, the integument being shining, especially on the first tergite; the portion of the first tergite in front of the carina smooth. Pubescence very short and scarce; grayish; denser and silvery on the clypeus.

Black, with the following ivory-white markings: a punctiform spot in the emargination and behind the upper part of the eyes; the under side of the antennal scape; a small spot (with ferruginous tinge in my specimens) on each side of the middle line on the pronotum; the posttegulæ; a very narrow preapical fascia on tergite 1, and a broader terminal one on tergite and sternite 2; a stripe on the outside of all the tibiæ; and a spot near the apex of the front femora. Mandibles and front legs for the most part ferruginous. Wings subhyaline, with a distinct dark spot in the apical half of the radial cell.

Length (h. + th. + t. 1 + 2), 8 to 8.5 mm.

♂ unknown.

Belgian Congo.— Faradje, 2 ♀♀, December 1912 (Lang and Chapin Coll.).

This species is related to *N. polydora* Kohl and is very interesting as a new illustration of the strongly marked acarophilous structures which seem to be more common among Hymenoptera than has been generally believed.

A very similar acarid chamber has been described by R. C. L. Perkins for both sexes of the Australian *Montezumia amaliæ* (Saussure) (= *Montezumia australiensis* Perkins): "Propodeum with a deep round fossa or chamber above the abdominal articulation; on each side of the chamber is a curved carina more or less pale colored, and in lateral view forming a projecting angle of the propodeum; a shorter curved carina externally to this forms with it a less deep cavity on either side of the median chamber, and this subsidiary cavities, like the latter, are often filled with acari."[1]

Labus gambiensis Meade Waldo, which must be placed in *Nortonia*, might possess a similar acarid chamber, for its description says: "median segment rounded posteriorly, a depression on the dorsal surface of the truncation."

27. **Nortonia tricarinulata**, new species

♀.— Head (Fig. 88) about as high as broad; subcircular. Clypeus (Fig. 85) slightly longer than broad; piriform; gradually narrowed from the base of the mandibles to its anterior margin. This margin is broadly truncate; straight, with bluntly rounded lateral angles. Clypeus two and one-half times as wide in the middle as on its apical margin. Surface of the clypeus with three very conspicuous longitudinal carinæ: a median one runs from the base to beneath the middle of the clypeus where it disappears gradually; this median carina is a continuation of the strongly raised frontal ridge which separates the insertions of the antennæ. A lateral, oblique, and feebly sinuate carina on each side is much stronger than the median one; it begins beneath the base on a feeble elevation of the surface of the clypeus and ends in the lateral angle of its anterior margin. Median part of the clypeus depressed below the middle towards its anterior margin. Vertex normally developed; with a small, but deep, circular fovea behind the ocelli. Distance between the eyes on the vertex one and one-half times that separating the eyes on the clypeus. Posterior ocelli only slightly more remote from the eyes than from each other. Temples margined by a strong raised carina, which ends near the upper angle of the eyes, the vertex not being margined behind. Mandibles beak-like; much shorter than the large ocular diameter; terminating in a long curved blunt apex; their inner margin behind the apex with four very superficial and rounded teeth. Antennæ (Fig. 91) inserted much beneath the middle of the head, short, with a distinctly swollen flagellum; scape long, slender, slightly curved; third antennal joint as long as the fourth plus half of the fifth; from the sixth to the eleventh the joints of the antennæ broader than long.

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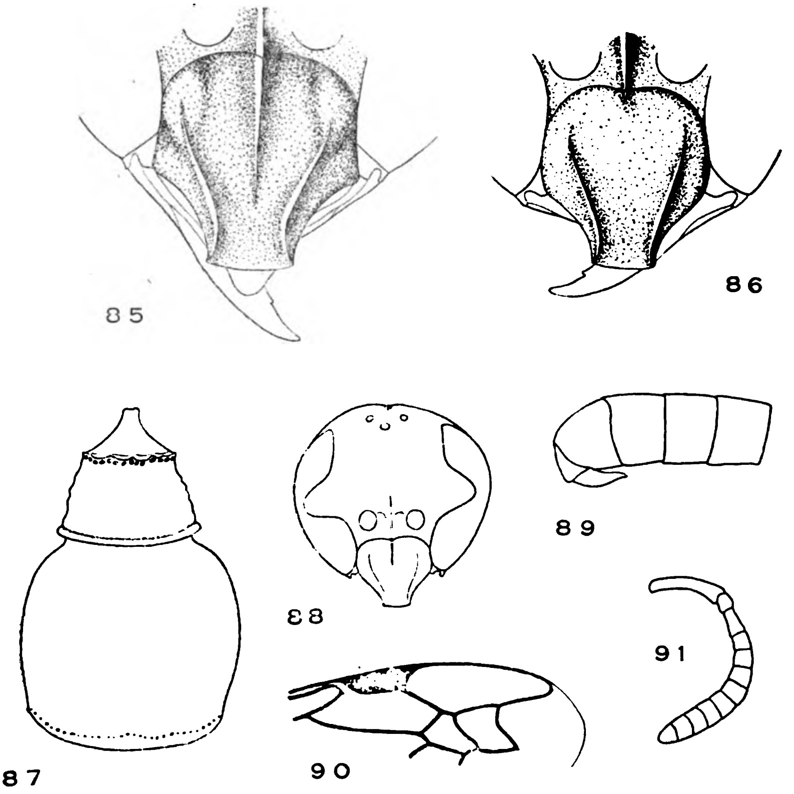
[1] Proc. Hawaiian Ent. Soc., II, No. 1, 1908, p. 33. I have seen one ♀ of *Montezumia amaliæ* (Saussure); its maxillary palpi are 5-jointed, its labial palpi 3-jointed. This species belongs therefore either in *Montezumia* or in *Parazumia*, as was recognized by G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XIV, 1915, p. 461.

Thorax (including the propodeum) as seen from above, one and one-half times as long as broad. Pronotum with a sharp, raised, anterior margin and slightly projecting, blunt, lateral angles. Mesopleura with a strong anterior carina limiting the epicnemia for the anterior legs. Mesonotum without parapsidal furrows. Scutellum rectangular, long and broad, flattened; on each side near its posterior margin with a strong, short, broadly rounded vertical lamella. Postscutellum transversely triangular, with a very short anterior horizontal portion, which passes gradually to a longer sloping posterior face. On the transition between the horizontal and sloping portion, one finds on each side a very strong, vertically raised, sharp, and irregular tooth. Propodeum short, as seen from above, with a very short hori-



Figs. 85–91. *Nortonia tricarinulata*, new species.

Fig. 85. Clypeus, ♀. Fig. 86. Clypeus, ♂. Fig. 87. Two basal abdominal tergites from above, ♀. Fig. 88. Head in front, ♀. Fig. 89. Terminal joints of antenna, ♂. Fig. 90. Venation of front wing, ♀. Fig. 91. Antenna, ♀.

zontal portion behind the postscutellum; without carinæ; deeply excavated on its middle; broadly rounded and somewhat swollen on its sides; its concavity with a median raised ridge; its lateral angles rounded. Below these rounded angles begins, on each side, a short membranaceous ridge, which ends in a very long and sharp tooth placed above the articulation of the abdomen. Legs normal. Middle tibiæ with one apical spur. Wings (Fig. 90) with a trapezoidal, broadly sessile second cubital cell, the third cubital cell much higher than long; the venation nearly the same in all the four specimens (2 ♀♀, 2 ♂♂) seen.

Abdomen (Fig. 87) broad and short, its first segment strongly narrowed. Its first tergite bell-shaped, with a distinct, but irregular and moderately strong transverse carina on its anterior third; the part in front of the carina narrowed into a short petiole; the horizontal part behind the carina about one and one-half times as broad at its apex as long, gradually widening towards its apical margin, which is thickly swollen and forms on each side a blunt projecting angle. Second tergite strongly swollen; nearly as broad as long; slightly over one and one-half times as broad as the first tergite; strongly constricted at its base which is much narrower than the apex of the first tergite; its hind margin feebly raised in a somewhat discolored lamella, preceded by an irregular transverse row of deeper punctures. Second sternite strongly swollen; rounded and sloping towards its base; without tubercles or grooves; its basal neck without row of longitudinal rimples. Segments 1 plus 2 about as long as the thorax.

Punctation strong and dense; subreticulate and nearly uniform on head, thorax, and abdominal segments 1 to 3; on the posterior abdominal segments finer and more remote; anterior sloping face of the first tergite (in front of the transverse carina) smooth and shining; clypeus without distinct punctures. Propodeum strongly and rugosely reticulate on its dorsal areas. Pubescence short, dull-silvery; long, erect, dense, and grayish on the first tergite.

Black, with ferruginous-red and yellowish-white markings. The median part of the clypeus, the mandibles, the greater part of the upper side of the scape and of the under side of the flagellum, the middle part and humeral calli of the pronotum, the tegulæ and postscutellum for the most part, spots on the sides of the propodeum, indefinite spots all over the first tergite, near the posterior margin and on the sides of tergite and sternite 2, the greater part of the front and middle legs, and a few spots on the hind legs, ferruginous. The following markings ivory-white: a transverse basal band on the clypeus; the under side of the scape; a very minute punctiform spot on the temples behind the upper half of the eyes; a terminal marginal band on tergite 1 and tergite and sternite 2, very narrow on tergite 1; a minute dot on the post-tegulæ; small spots or stripes on the coxæ, on the outside of all the tarsi, and on the outside of the front and middle tibiæ. Wings subhyaline, with darkened spots towards the end half of the radial cell and the end of the median cell.

Length (h. + th. + t. 1 + 2), 7.5 to 8 mm.

♂.— Very much like the female in shape, sculpture and coloration. Differs chiefly by the clypeus (Fig. 86) which is about as broad as long and bears only the two lateral carinæ; the median carina completely lacking. Terminal hook-like joint of the antennæ (Fig. 89) small; thick; gradually tapering towards its blunt apex, which reaches the apex of the tenth antennal joint. The pale yellow markings are more extended on the base of the clypeus and on the legs and there is an indication of a pale terminal band on tergite 3.

Length (h. + th. + t. 1 + 2), 7.5 to 8 mm.

Belgian Congo.— This species is found in the eastern part of the Congo Forest. The holotype is a female from Lubutu, January 23, 1915 (J. Bequaert Coll.); the allotype is a male from Stanleyville, April 9, 1915 (Lang and Chapin Coll.). I have seen also one female and one male from Walikale, January 1915 (J. Bequaert Coll.).

This species is closely related to *N. braunsii* Kohl, from which it may be easily distinguished by the structure of the clypeus; this character separates it also from all the African species of *Ancistrocerus*, in which it might be included just as well as in *Nortonia*, forming a transition between these two genera.

28. **Nortonia bisuturalis** (Saussure)

♀.— Clypeus broader than long; piriform; terminating in a broad apex, which is distinctly, although not profoundly, arcuately emarginate. Lateral angles of this apex distinctly projecting and bluntly rounded. A short and very feeble longitudinal carina limits near the apical margin, on each side, the median depressed part of the clypeus. Vertex normal, with a small circular fovea behind the ocelli. Distance between the eyes on the vertex about one and one-half times that between the eyes on the clypeus. Posterior ocelli about as far from each other as from the inner margin of the eyes. Temples margined by a strongly raised carina, which becomes indistinct in the upper part of the head behind the vertex. Mandibles beak-like, about as long as the great ocular diameter, with four sharp and well-developed teeth along their inner margin in front of their sharply curved apex. Antennæ inserted beneath the middle of the head, short, with a feebly swollen flagellum; scape very long, slender, strongly curved, about half as long as the flagellum; third antennal joint comparatively short, only slightly longer than the fourth.

Thorax elongate; as seen from above, without the propodeum, distinctly longer than broad. Pronotum without raised anterior margin; its lateral angles feebly projecting, blunt. Mesonotum about as long on its middle line as its largest width; with short traces of parapsidal furrows in front of the scutellum. Scutellum rectangular; large; flattened; without spines or raised lamellæ; on each side, behind the posttegulæ, with a deep pit filled with mites. Postscutellum transverse, very feebly raised, without spines or lamellæ. Mesopleura only with a very feeble, rounded and vertical ridge in their anterior part below. Propodeum comparatively short; with a distinct horizontal face behind the postscutellum; slightly grooved on its middle line. Posterior face of the propodeum nearly vertical; scarcely excavated in its upper part; but in its inferior portion, above the insertion of the abdomen, with a very deep excavation on each side of a strong median carina; both excavations being also margined behind by a very strong carina; mites are very often found in these excavations. Superior and inferior ridges, as also the lateral angles of the propodeum, rounded; the lateral ridge with a feebly raised carina. Above the articulation of the abdomen there is, on each side, a strong decolorate spine, flattened towards its base into three lamellæ and covered with long hairs. Legs normal; hind coxæ with a strong tooth on their upper face; middle tibiæ with one apical spur; claws deeply bifid at their apex. Wing venation of the ordinary *Odynerus* type.

Abdomen elongate and narrow; its second segment scarcely twice as broad as the first, this species being in this respect a transition between *Ancistrocerus* and the typical species of *Nortonia*, such as *N. morula* Kohl. First tergite bell-shaped (Fig. 92); with a very strong, irregularly sinuate, transverse carina, which is situated close to its base and followed by a row of strong longitudinal ridges; the part in front of the carina nearly vertically sloping towards the articulation of the thorax. Horizontal part of the first tergite about as long on its middle as broad at its apex. Second tergite about as broad as long, with a deep acarid chamber at its base (Fig. 93); its sternite abruptly sloping against the basal, transverse neck, which presents a row of longitudinal rimples.

Punctation very close and strong on the head, except on the clypeus where the punctures are scattered; the inferior part of the clypeus striate. The punctation is still stronger, but not so dense on the thorax; the dorsal areas of the propodeum are finely and rugosely reticulate. First tergite smooth in front of, and partly behind, its transverse suture; the posterior two-thirds of its horizontal face densely covered with strong punctures; very often the limit between the smooth and punctate part simulates a transverse suture, and this may have induced H. de Saussure to describe this species as possessing two transverse sutures on the first tergite.[1] Second segment with abundant, moderately strong punctures, which are more scattered on its sternite and denser on its tergite; the following segments, with the exception of the terminal one, minutely, but distinctly, punctate.

Black, with very few ferruginous and yellowish-white markings. The clypeus, mandibles, antennal scape, anterior and posterior margins of the pronotum, tegulæ, legs for the major part, a spot on the sides of tergite 1, and the terminal abdominal segments as a rule more or less, ferruginous; often the clypeus is black with ferruginous or yellow spots, and the lateral ferruginous spots on tergite 1 may be absent. The following parts are ivory-yellow: a basal stripe and two preapical spots on the clypeus, which are sometimes absent; a minute frontal spot above the insertion of the antennæ; a minute dot on the upper part of the temples; a spot in each of the anterior angles of the pronotum; the posttegulæ; two minute dots on the postscutellum; and narrow apical bands on tergite 1 and on tergite and sternite 2. Wings hyaline, with a smoky spot in the apex of the median cell and in the apical half of the radial cell.

Length (h. + th. + t. 1 + 2), 6.5 to 8 mm.

♂.— Very similar to the female. Clypeus slightly more elongate; its apical margin very broad, slightly sinuate-emarginate; without any trace of carinæ; shining and nearly impunctate. Antennæ moderately elongate; shaped as in *N. braunsii* Kohl, ♂; their terminal, hook-like joint distinctly curved, broadly flattened and gradually tapering to an acute apex, which reaches to the middle of the tenth joint; terminal half of the tenth and the whole of the eleventh joint deeply grooved on the under side. Claws not so deeply bifid as in the female. Clypeus entirely yellow; the under side of the antennal scape and a stripe on the mandibles, of the same color.

Length (h. + th. + t. 1 + 2), 6.5 to 7 mm.

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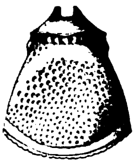
[1] G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 501, has studied the type specimen in the British Museum and pointed out that *N. bisuturalis* (Saussure) presents only one transverse carina on its first tergite.

Belgian Congo.— Stanleyville, April 1915, 6 ♀♀ and 4 ♂♂ (Lang and Chapin Coll.).

This little wasp is very interesting on account of its various symbiotic relations with mites. It presents two different systems of cavities, which have apparently no other use than to shelter acarids.

1. The most conspicuous of these acarid chambers is a large cavity located on the dorsal face of the abdomen, at the articulation between its first and second tergite. When the abdomen is stretched out in its normal position so as to have its entire longitudinal axis in a straight line with the thorax, the acarid chamber is completely hidden from sight by the posterior margin of the first tergite, which glides over the basal neck of the second tergite. In bending the second segment downward at its articulation with the first, one discovers on the middle line of the short, basal neck of the second tergite, a small longitudinal groove or fovea leading to the acarid chamber; this chamber can be properly studied only when the second segment is removed at its basal articulation (Figs. 93 and 94). It appears then that the duplicature of the integument at the very base of the second tergite is much enlarged in this species, forming a broad and long, chitinous, somewhat discolored lamella; this lamella projects above a deep, transverse excavation of the integument at the base of the second tergite. The closed chamber thus formed is as a rule filled with numerous mites; their number may grow so large that they lift up the lamella and can then partly be seen from the outside, underneath the apical margin of the first tergite, when the second segment is bent downward. The normal entrance to the chamber seems, however, to be the longitudinal fovea (Fig. 93, *gr*) on the middle line. It must still be noted that the apical margin of the first tergite is



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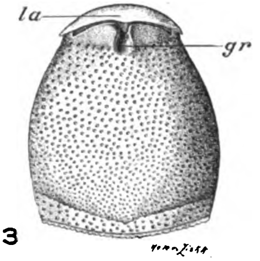

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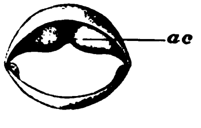

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Figs. 92–94. *Nortonia bisuturalis* (Saussure).

Fig. 92. First abdominal tergite from above. ♀. Fig. 93. Second abdominal tergite, ♀, removed from its articulation with the first: *la*, basal lamella covering the acarid chamber; *gr*, elongate groove leading in the chamber. Fig. 94. Basal part of the second abdominal segment, ♀, seen in front, showing the acarid chamber (*ac*) projecting in the cavity of the abdomen.

arcuately projecting on the middle line behind, so as to cover entirely the opening of the median fovea of the second segment when this is bent upward; as a result the presence of this acarid chamber is easily overlooked.

The size of this abdominal mite chamber is comparatively large, as can be seen in Fig. 94, showing the basal articulation of the second segment in front view; it will be noted that the chamber is slightly constricted in the middle, forming thus two pouches.

2. The usual depressions at the sides of the scutellum, behind the posttegulæ, which receive the base of the front wings at rest, are in *Nortonia bisuturalis* (Saussure) modified into deep cavities, which are as a rule densely filled with mites. It is possible that these cavities form real pouches inside the thorax.

Numerous mites are also often found filling the excavations at the apex of the propodeum in front of the strong terminal transverse carina at the articulation of thorax and abdomen; but these depressions are not such typical acarid chambers as those described above.

All these acarid chambers exist in both female and male, but seem to be better developed in the female.

A few remarks on the occurrence of acarid chambers among Hymenoptera might not be out of place, since the subject is of general interest with regard to the problem of symbiosis. The oldest known and most remarkable instance is that of the Carpenter Bees belonging to *Mesotrichia* Westwood (= *Koptortosoma* Gribodo), a subgenus of *Xylocopa* with numerous species in the Old World tropics. In these bees, the mite chamber is a voluminous pouch inside the first abdominal segment, opening on its anterior, concave face. The mites which are found in this chamber belong to three genera: *Trichotarsus* of the family Tyroglyphidæ, and *Hypoaspis* and *Paragreenia* of the family Parasitidæ.[1]

Among the Vespidæ, the mite chamber of *Montezumia amaliæ* (Saussure) only has been completely described (p. 99). In this paper, I have recorded acarid chambers for the following African species: *Nortonia acarophila*, n. sp. (p. 98); *N. bisuturalis* (Saussure) (p. 104); *N. braunsii* Kohl (p. 106); and *Ancistrocerus kisangani*, n. sp. (p. 116). However, such structures must be rather common in this family; they are found even in some North American species. Perkins [2] incidentally noticed a mite chamber at the base of the second abdominal tergite in an unidentified *Odynerus* from Arizona and Mexico.

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[1] A. C. Oudemans, Zoolog. Anzeiger, XXVII, 1904, pp. 137–139; R. C. L. Perkins, Entom. Monthly Mag., (2), X, 1899, pp. 37–39.

[2] Entom. Monthly Mag., (2), X, 1899, p. 39. N. Banks (The Acarina or Mites. U. S. Depart. of Agric. Office of the Secretary. Report No. 108, 1915, p. 84) apparently repeats Perkins' note on this wasp.

I have had, thus far, little opportunity of studying North American wasps; yet I can record the existence of acarid chambers in the following three species: *Ancistrocerus fulvipes* (Saussure), ♀ and ♂; *Odynerus conformis* Saussure, ♂ and ♀; and *Odynerus collega* Saussure, ♀ and ♂.[1] In all these the mite chamber is of the same type as in *Ancistrocerus kisangani*, a cavity at the base of the second abdominal tergite. The constriction at the base of this tergite is deeply depressed; its basal lamella is raised and slightly widened. The apical margin of the first tergite covers this depression completely when the abdomen is bent upward; the rather spacious cavity thus formed is entirely filled with minute mites. There is, however, no longitudinal groove on the middle line allowing the mites to enter the chamber. The whole structure is much less perfect than in *Ancistrocerus kisangani*, *Nortonia bisuturalis*, and *N. braunsii*.

29. **Nortonia braunsii** Kohl

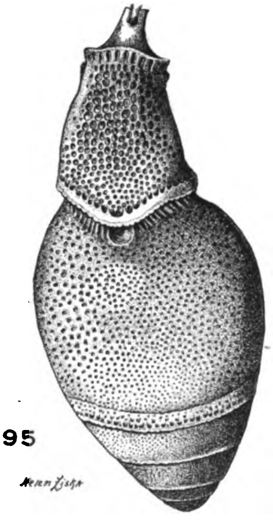

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Fig. 95. *Nortonia braunsii* Kohl, basal part of the second abdominal tergite, ♀, showing the entrance to the acarid chamber as it is partly covered by the apical margin of the first tergite when the second segment is bent downward.

This species has been thoroughly studied and clearly figured by Kohl; this author, however, has overlooked the abdominal acarid chamber, which has the same position and structure as in *N. bisuturalis* (Saussure) so that it does not need to be redescribed here. Its entrance may be seen in Fig. 95, at the base of the second tergite.

N. braunsii and *N. bisuturalis* are closely related, so closely indeed that I was at first inclined to consider them as forming a single species. The following are the only differences which I am able to discover between them. (1) The shape of the first tergite, which in *N. bisuturalis* is about the same in female and male, its horizontal face being about as long on its middle as broad at its apex. In *N. braunsii* there seems to be a difference, in this respect, between the two sexes: the female has the first tergite as in *N. bisuturalis;* but in the male the horizontal face is slightly longer than broad. (2) The punctation of the first tergite, which is more remote in *N. bisuturalis* and usually leaves a long, smooth space behind the suture. In *N. braunsii* the punctures are denser and also finer, and nearly completely cover its horizontal face. (3) The coloration, which is almost exclusively black and yellow in *N. bisuturalis;* whereas *N. braunsii* is extensively marked with ferruginous-red, this color also forming lateral spots on the first and second tergites.

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[1] These names can only be given as approximate identifications. The distinctions between the numerous North American species of *Ancistrocerus* and *Odynerus* have been made chiefly on the color. Thus correct identification, even of the common species, by the published descriptions is extremely difficult.

Belgian Congo.— Boswenda, 1900 m. (north of Lake Kivu), 1 ♀, October 22, 1914; and Kasindi (north of Lake Albert Edward), 2 ♂♂, August 1914 (J. Bequaert Coll.).

I have also seen one female from Lourenzo Marques (Collection of Cornell University), and 1 ♀ and 1 ♂ from Algoa Bay (Cape Colony; Dr. H. Brauns Coll.). These South African specimens are a little larger than those from the Congo, but do not present any other difference.

30. **Nortonia polydora** Kohl

This species possesses no acarid chambers of any kind. It is probably a synonym of *Odynerus heydenianus* Saussure, which is undoubtedly a *Nortonia* as I have defined the genus. The description of *O. heydenianus* agrees fairly well with my specimens of *N. polydora* Kohl.

Belgian Congo.— Stanleyville, April 1915, 4 ♀ ♀ and 2♂ ♂; Avakubi, October 1909, 1 ♀ (Lang and Chapin Coll.). Lubutu, January 2, 1915, 1 ♀ (J. Bequaert Coll.).

31. **Nortonia fragosa** Kohl

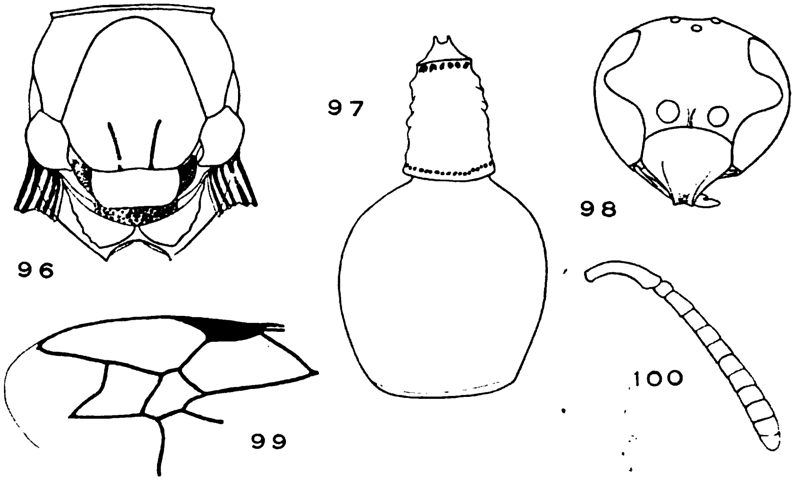
No acarid chamber. There hardly seems to be a distinction between this species and *N. soror* Kohl.

Belgian Congo.— Boma, June 10, 1915, 1 ♂ (Lang and Chapin Coll.).

32. **Nortonia morula** Kohl

♀.— Head (Fig. 98) subcircular, scarcely broader than high. Clypeus piriform; distinctly broader than long; strongly narrowed from the base of the mandibles towards its terminal margin, the breadth of which is about one-fourth of the total width of the clypeus; this apical margin very slightly, arcuately emarginate, with broadly rounded, scarcely projecting lateral angles; a conspicuous longitudinal carina starts from each angle and runs in an oblique direction to the middle length of the clypeus. Clypeus normally convex in its upper part; depressed between the longitudinal carinæ in its inferior half. Vertex normal, without depressed groove behind the ocelli; distance between the eyes on the vertex one and one-quarter that on the clypeus; posterior ocelli slightly nearer to each other than to the eyes. Temples gradually broadening from the base of the mandibles to the vertex; margined by a strong raised carina, which is less pronounced behind the vertex. Mandibles beak-like; about as long as the great ocular diameter; terminating in a broad, blunt, and slightly curved apex; their inner margin with four broad, obtuse teeth. Front with a short, but very distinct, raised ridge between the insertion of the antennæ. Antennæ (Fig. 100) inserted on the middle of the head; their scape very slender and strongly curved, longer than one-third of the flagellum; their flagellum slender, feebly swollen towards its apex; the second joint of the flagellum only slightly longer than the third.

Thorax (Fig. 96), as seen from above, only slightly longer than broad. Pronotum margined anteriorly by a very strong raised carina; only feebly angulate on its sides. Propleura with a strong vertical carina; a similar, very strong ridge limits the epicnemia of the front legs on the mesopleura. Parapsidal furrows distinct in the posterior third of the mesonotum in front of the scutellum. Scutellum transversely rectangular; flat; separated on each side from the tegulæ by a very broad and deeply depressed groove. Postscutellum raised; with a conspicuous, but irregularly sinuate, transverse ridge, which is slightly depressed into a saddle so as to form on each side a feeble tubercle; the surface of the postscutellum, in front and behind the transverse ridge, very rugosely reticulate and punctate. Propodeum short, with a very short horizontal or slightly sloping basal portion, behind which it is abruptly vertical; with a longitudinal groove, which widens into a very deep posterior concavity. The lateral, superior, and inferior ridges of the propodeum pronounced, but not carina-shaped; its lateral angles obsolete, broadly rounded. In its apical part, the propodeum ends, on each side of the articulation of the



Figs. 96–100. *Nortonia morula* Kohl.

Fig. 96. Thorax from above, ♀. Fig. 97. Two basal abdominal tergites from above, ♀. Fig. 98. Head in front, ♀. Fig. 99. Venation of front wing, ♀. Fig. 100. Antenna, ♀.

abdomen, in a small, but sharply projecting, decolorate tooth. Legs and wings (Fig. 99) normal. Middle tibiæ with one apical spur.

Abdomen (Fig. 97) much like that of *Eumenes;* its first segment narrow, nearly petiole-shaped, with a distinct raised transverse carina at a very short distance from its base. The horizontal face of the first tergite, behind the carina, is one and one-third times as long as broad at its apex; only slightly and very gradually broadening towards the hind margin, which is scarcely projecting and rounded at its lateral angles. The whole surface of tergite 1 is covered with a coarse, reticulately rugose punctation, which gives to the sides of the tergite, as seen from above, an irregularly serrulate appearance; the surface of this tergite is very feebly depressed before its hind margin. Second segment depressed and spheroidal; much broader and distinctly longer than the first; its base narrower than the end margin of tergite 1; its hind margin distinctly depressed, simple, not discolored, preceded by a line of deeper punctures. Segments 1 plus 2 about one and one-half times as long as the thorax, when seen from above. Second sternite broadly convex and gradually sloping towards its base, which has no row of deeper and larger punctures.

Punctation dense and coarse on head and thorax; finer on the basal part of the clypeus; the inferior depressed half of which presents a small number of oblique punctures giving it a substriate appearance. Propodeum very coarsely and reticulately rugose, even more strongly so than on tergite 1; its concavity more finely rugose. Tegulæ shining, with a few, scattered, extremely minute punctures. Punctation on tergites 2 and 3 very distinct, scattered but minute, the punctures much finer than on the thorax and sharply contrasting with the rugose sculpture of the first tergite; punctures finer and more remote on sternite 2. Pubescence grayish- or silvery-white; very long and erect on the first tergite. Nearly entirely black; the apical half of the mandibles, the under side of scape and flagellum, and the inner side of the front legs partly, ferruginous-brown; the only whitish-yellow markings are two short longitudinal lines on the terminal third of the clypeus, corresponding to the raised carinæ, and a narrow transverse spot on each angle of the apical margin of tergite 1. Wings feebly smoky, with a purplish effulgence, much darker along the costa, in the apex of the median cell, and over nearly the whole of the radial cell.

Length (h. + th. + t. 1 + 2), 8 mm.

The male was described by F. Kohl and is said to be similar to the female.

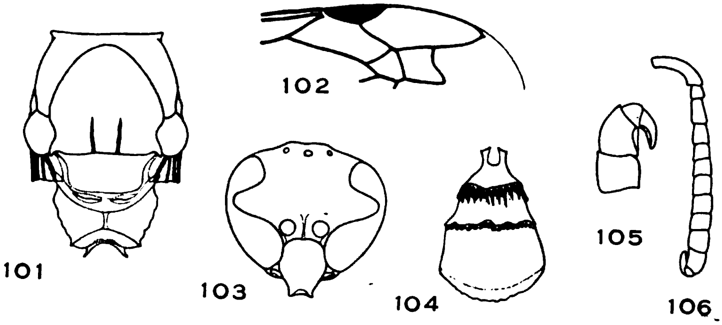
Belgian Congo.— Lesse, Semliki Forest, 1 ♀, August 21, 1914 (J. Bequaert Coll.). Stanleyville, 2 ♀ ♀, March 1915 (Lang and Chapin Coll.).

The shape and strong sculpture of the first abdominal tergite, as also the transverse carina of the postscutellum, are very striking.

33. **Nortonia malelensis,** new species

♂.— Head (Fig. 103). Clypeus about as broad as long; with a broad apical margin, ending in a wide discolored lamella, which is very feebly sinuate at its apex and has bluntly rounded lateral angles. This lamella may escape notice and the apex of the clypeus seems then to be semicircularly emarginate, with strongly projecting angles. The surface of the clypeus scarcely convex, without carinæ. Vertex normal, without fovea; the posterior ocelli slightly more remote from each other than from the inner margin of the eyes. Temples and vertex margined behind by a very strong carina. Mandibles beak-like; distinctly shorter than the great ocular diameter; comparatively broad; with three indistinct teeth in front of their feebly curved apex. Antennæ (Fig. 106) inserted much beneath the middle of the head; long and slender, with comparatively short scape; their flagellum only moderately and very gradually swollen towards its apex; third antennal joint scarcely longer than the fourth; terminal hook-like joint (Fig. 105) small, feebly curved, flattened beneath, its blunt apex not quite reaching to the base of the eleventh joint; only the eleventh joint presents a narrow groove on its under side.

Thorax (Fig. 101), as seen from above, without the propodeum, only slightly longer than broad. Pronotum without raised anterior margin; very bluntly rounded; its lateral angles short, but rather sharply projecting. Mesonotum about as long on its middle line as its largest width; with short but deep traces of two parapsidal furrows in front of the scutellum, near its middle line. Scutellum rectangular; nearly flat; without spines or lamellæ; its lateral depressions deep, but not used as acarid chambers. Postscutellum transverse; without spines; swollen into a transverse ridge, which is slightly depressed on its middle so as to make it bituberculate. Mesopleura with a very feeble, rounded, vertical ridge on their anterior part beneath. Propodeum comparatively long, with a median horizontal face about as long as the postscutellum and only feebly depressed into a saddle on its middle line. Posterior face of the propodeum vertical, nearly flat in its upper part; with two deep terminal excavations bordered behind by a transverse carina in front of the articulation of the abdomen. These apical excavations are as well developed as in *N. bisuturalis* (Saussure), but I have not found mites in them. Lateral, inferior, and superior ridges of the propodeum forming feebly raised carinæ; its lateral angles distinct, but bluntly rounded. On each side of the articulation of the abdomen, the propodeum is prolongated behind in a strong, decolorate spine. Legs normal; hind coxæ with a strong tooth on their upper face; middle tibiæ with one apical spur; claws superficially bifid at their apex. Wing venation (Fig. 102) of the ordinary *Odynerus* type and apparently variable; the third cubital cell comparatively large.



Figs. 101–106. ***Nortonia malelensis*, new species.**

Fig. 101. Thorax from above, ♂. Fig. 102. Venation of front wing, ♂. Fig. 103. Head in front, ♂. Fig. 104. First abdominal tergite from above, ♂. Fig. 105. Terminal joints of antenna, ♂. Fig. 106. Antenna, ♂.

Abdomen elongate, very slender; its second segment twice as broad as the first, undoubtedly of the *Nortonia* type. First tergite (Fig. 104) bell-shaped; with two distinct transverse carinæ, of which the anterior is, however, much stronger than the posterior. This anterior carina is very high and sharp, slightly sinuate, and placed close to the base of the first tergite; the part in front of it nearly vertically sloping towards the articulation of the thorax; it is margined behind by a row of very deep depressions, separated by elongate rimples. The posterior carina is much less pronounced, more of the shape of a transverse suture, irregularly sinuate, placed about the middle of the first tergite; it is margined behind by a row of broad, moderately deep punctures. Horizontal face of the first tergite, behind the anterior carina, about as long on its middle line as broad at its apical margin; its anterior vertical face and the portion between the two carinæ are smooth, impunctate; the part behind the posterior carina is scattered with strong punctures, except on the slightly swollen apical margin. Second segment distinctly longer than the first, slightly longer than broad, without acarid chamber at its base; its basal neck smooth on its tergite, with a row of strong longitudinal rimples on its sternite; its sternite gradually sloping towards its base.

Punctation very dense and coarse on the head, except on the clypeus where it is very superficial and remote; its terminal decolorate lamella being impunctate. Punctation stronger, but more remote on the thorax; the center of the scutellum and the larger part of the mesopleura smooth and shining, with very few punctures. Tegulæ impunctate and shining. Propodeum almost entirely and very coarsely, rugosely reticulate. For the sculpture of the first tergite, see above. Punctation much finer and more scattered, but very distinct, on the second segment; still finer on segments 3 to 6.

Black, with the following pale ivory-yellow markings: the clypeus except for its basal and upper lateral margins; a stripe on the under side of the antennal scape; a spot on the outer face of the mandibles; a small dot on the front above the insertion of the antennæ; a minute dot on the upper part of the temples; a narrow apical band on tergite 1 and on tergite and sternite 2; the outer side of the front and middle tibiæ; a spot on the base of the hind tibiæ and at the apex of the front femora. In one of the specimens the apex of the posttegulæ is yellow; in the others the thorax, including the tegulæ, is entirely black, only the terminal spines at the sides of the articulation of the abdomen being decolorate and whitish. The apical hook of the antennæ and a few tinges on the legs are brownish. Wings subhyaline, smoky towards the end of the median cell and over the greater part of the radial cell.

Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.

♀ unknown.

Belgian Congo.— Description based on 4 ♂♂ from Malela, July 1915. (Lang and Chapin Coll.).

This species is very distinct from all the other species of *Nortonia* known to me, in the presence of two transverse carinæ on the first tergite. It may, however, be a synonym of *Odynerus imbecillus* Saussure, which is described as having two sutures on the first tergite; but it is uncertain whether this species belongs to *Ancistrocerus* or to *Nortonia*, as defined in this paper (compare *Ancistrocerus kisangani*, p. 115).

Ancistrocerus Wesmael

While discussing the generic characters of *Odynerus* Latreille (p. 120), I have explained why I believe that *Ancistrocerus* may reasonably form a valid genus among the Eumeninæ. Considering the very large number of specific forms of the *Odynerus* type, transitions between *Ancistrocerus* Wesmael and *Odynerus* Latreille, as defined in this paper, are few in number. They are not found in Africa, but form a small group of American species which were separated by H. de Saussure[1] in a "divisio *Pseudodynerus*": in these the transverse suture of the first tergite becomes obsolete; as a rule it is completely absent on its middle line and only visible on its sides. The North American *Odynerus quadrisectus* Say is a very good illustration of this. Such species can be placed indifferently either in *Ancistrocerus* or in *Odynerus*.

Ancistrocerus is found all over the world; the species are always small or medium-sized; the total length seldom attains 15 mm. Nineteen species have been recorded from the Ethiopian region.

Ethology. The life history is known for a few species from Europe: *A. parietum* (Linné), *A. murarius* (Linné), *A. trifasciatus* (Fabricius), *A. crassicornis* (Panzer), *A. bifasciatus* (Linné), *A. callosus* (Thomson), *A. antilope* (Panzer), *A. nidulator* (Saussure), and *A. oviventris* (Wesmael); and from North America: *A. capra* (Saussure) and *A. birenimaculatus* (Saussure). It is similar to that of *Odynerus;* the prey consists of caterpillars, more rarely of larvæ of beetles or saw-flies; the clay cells are built inside cavities or galleries in succession, or they are aggregated into free mud lumps.

Ancistrocerus roubaudi (J. Bequaert) is an African species which has been studied by Roubaud[2] in the Sudan. The female was burrowing short and narrow galleries in the clayey wall of an old mud nest of *Synagris spiniventris*. At the entrance was built a short, straight chimney of clay. The prey consisted of caterpillars and was probably brought in hastily before the egg was hatched. Remains of a parasite, *Mesostenus tripartitus* Brullé, were found in one of the cells.

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[1] Et. fam. Vesp., III, Suppl., 1854, p. 220; E. Zavattari, Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, 1912, p. 237.

[2] Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 36 and 37.

Key to the Congo Species of *Ancistrocerus*[1]

Six species have been found in the Belgian Congo: *A. massaicus* (Cameron), *A. budongo* (G. Meade Waldo), *A. lufiræ* (G. Meade Waldo), *A. neavei* (G. Meade Waldo), and two species which are described here as new, *A. kisangani* and *A. zairensis.*

1. First abdominal tergite with two transverse carinæ. Subgenus *Subancistrocerus* Saussure (= *Epancistrocerus* Dalla Torre)........................2.
   First abdominal tergite with a single transverse carina. Subgenus *Ancistrocerus sensu stricto*..4.

2. Posterior half of mesonotum and scutellum shining, almost impunctate. Posterior ocelli about as far from each other as from the inner margin of the eyes. Horizontal face of the first tergite distinctly broader at its apex than long on its middle line. Coloration black, with yellow markings; only feebly rufous on antennæ and legs; the clypeus yellow, with a large central black spot. Length ♀ (h. + th. + t. 1 + 2), 6 mm.; ♂ unknown.
   A. budongo (Meade Waldo).
   Mesonotum and scutellum uniformly and coarsely punctate all over. Posterior ocelli distinctly more remote from each other than from the inner margin of the eyes..3.

3. ♀. Horizontal face of the first abdominal tergite, behind its anterior transverse carina, much broader at its apical margin than long on its middle line (Fig. 107); second tergite without an acarid chamber. Coloration black and ferruginous with yellow markings; the clypeus, entirely, and the first abdominal segment, for the major part, ferruginous. Length (h. + th. + t. 1 + 2), 6 mm.; ♂ unknown..............................*A. massaicus* (Cameron).
   ♂. Horizontal face of the first abdominal tergite as long as or slightly longer on its middle line than broad at its apical margin (Fig. 108); base of the second tergite with a deep chamber filled with mites. Coloration chiefly black, with yellow markings; the clypeus entirely yellow. Length (h. + th. + t. 1 + 2), 7.5 mm.; ♀ unknown...............*A. kisangani*, new species.

4. Third abdominal tergite minutely punctate on its sides, its middle part with a striking group of very deep and large punctures. Terminal hook-like joint of the ♂ antennæ (Fig. 115) very strong; its base with a lateral expansion; its blunt and somewhat twisted apex reaching the base of the tenth antennal joint. Clypeus very feebly emarginate at its apex, almost equally so in both sexes; without carinæ. Sides of the propodeum rounded. Length (h. + th. + t. 1 + 2), 6 to 7 mm.......................*A. zairensis*, new species.
   Third abdominal tergite uniformly and minutely punctate over the whole of its apical half. Hook-like joint of the ♂ antennæ normal; in *A. neavei* (Fig. 117) small and only reaching to the base of the eleventh joint)................5.

5. Clypeus as broad as long; narrowly projecting towards its apex, which is deeply emarginate in the ♂, truncate in the ♀. Sides of the propodeum with blunt

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[1] Compare the key of the species of *Nortonia*, pp. 95 to 97.

lateral tubercles. Black; with apical bands on tergite 1 and sternite and tergite 2, spots on mandibles and clypeus and between the antennæ, and a narrow line on the anterior margin of the pronotum, yellow. In the ♂ the clypeus may be entirely yellow. Head, thorax and tergite 1 with long, erect, griseous pubescence. Wings black, with purplish effulgence, very ample. Length (h. + th. + t. 1 + 2), 9 mm............*A. neavei* (Meade Waldo).

Clypeus as broad as long; slightly convex; narrowly projecting towards its apex, which is bidentate in ♀ and ♂; these two teeth are the termination of longitudinal carinæ, starting in the apical half of the clypeus. Propodeum with rounded lateral angles. Black; with apical bands on the abdominal segments 1 to 4, the under side of scape, the base of clypeus, a spot on the front, behind the eyes and on either side of the anterior margin of the pronotum, and the tibiæ for the larger part, yellow. Flagellum in the ♀, mandibles, apex of clypeus, tegulæ, and tarsi ferruginous. Sparse, pale pubescence all over the body. Wings hyaline, slightly fuscous in the radial cell. Total length, 8 mm. (Katanga)[1]..................................*A. lufiræ* (Meade Waldo).

34. **Ancistrocerus massaicus** (P. Cameron)

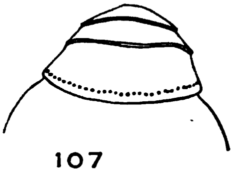
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Fig. 107. *Ancistrocerus massaicus* (P. Cameron), first abdominal tergite from above, ♀.

This species possesses no acarid chamber at the base of the second abdominal tergite and can therefore be readily distinguished from the related *A. kisangani.* It was thus far only known from British East Africa. The characters given in the key separate it from its closest ally *A. budongo.* Fig. 107 shows the peculiar shape of its first abdominal tergite.

Belgian Congo.— One ♀ collected by Mr. Lang at Boma, June 15, 1915.

35. **Ancistrocerus budongo** (G. Meade Waldo)

This species is easily known by the presence of two transverse carinæ on the first tergite and the peculiar punctation of the thorax. There is no acarid chamber at the base of the second abdominal tergite and the shape of the first tergite is very much like in *A. massaicus* (Cameron), its horizontal portion, behind the anterior transverse carina, being distinctly shorter on its middle line than broad at its apical margin.

Belgian Congo.— One ♀ from the Upper Ituri forest, Epulu River (between Penge and Irumu), February 21, 1914, altitude 700 m. (J. Bequaert Coll.), agrees in every detail with Meade Waldo's accurate description.

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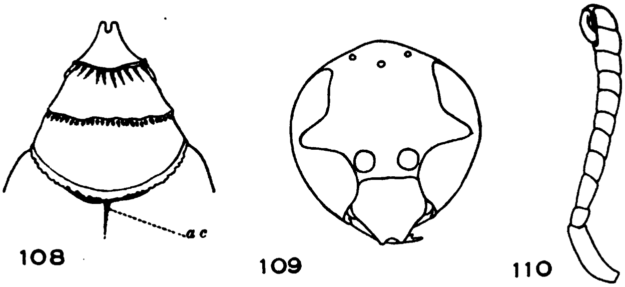
[1] After the description given by Meade Waldo, as I have not seen that species.

36. **Ancistrocerus kisangani**, new species

Plate I, Figure 8

♂.— Head (Fig. 109) subcircular. Clypeus nearly as broad as high; terminating in a broad apical margin, which is deeply and arcuately emarginate; its lateral angles broadly rounded; its surface without any carinæ. Vertex normally developed, without fovea; posterior ocelli slightly more remote from each other than from the inner margin of the eyes. Distance between the eyes on the vertex less than twice that on the clypeus. Temples margined by a strongly raised carina, which continues behind the vertex. Mandibles comparatively short; beak-like; much shorter than the great ocular diameter; their inner margin with three strong and sharp teeth before their apex. Antennæ (Fig. 110) inserted much beneath the middle of the head, rather elongate; their flagellum gradually, though feebly, swollen towards its apex; third antennal joint only slightly longer than the fourth. Their terminal hook-like joint strong, thick and elongate, flattened on its under side and rounded above, strongly curved on its middle; its thick and very blunt apex reaching to the middle of the tenth antennal joint; the tenth and eleventh joints deeply excavated beneath.



Figs. 108–110. *Ancistrocerus kisangani*, **new species**

Fig. 108. First abdominal tergite from above, ♂, showing the entrance (*ac*) to the acarid chamber. Fig. 109. Head in front, ♂. Fig. 110. Antenna, ♂.

Thorax, as seen from above (not including the propodeum), scarcely longer than broad. Pronotum without raised anterior margin, its lateral angles sharply projecting; on the sides of the pronotum a raised carina runs from these angles along their anterior margin, and in their posterior angle there is a deep fovea in front of the shoulder tubercles. Mesonotum with short parapsidal furrows near its posterior margin. Scutellum flat; normal. Postscutellum short; transverse; its anterior part raised, on each side of a feeble median furrow, into transverse and flattened tubercles. Mesopleura with a very strong vertical carina on its anterior part; the sutures dividing the episternum and separating the epimerum marked by a row of very strong and deep punctures. Propodeum comparatively long, with a distinct horizontal area behind the postscutellum; this area as long as the postscutellum itself; depressed on its middle into a deep longitudinal groove. Posterior concavity deep. The superior ridge of the propodeum abruptly rounded; its lateral ridge distinct, but not carinate; its inferior ridge, however, forms a short, compressed and decolorate lamella between its rounded lateral angle and the strongly projecting tooth which is placed on each side of the articulation of the abdomen. Legs normal; middle tibiæ with one apical spur; claws distinctly bifid at their apex. Posterior coxæ with a very strong tooth on their upper side. Wing venation of the ordinary *Odynerus* type.

Abdomen slender and elongate. Its first segment distinctly narrower than the second, the two being separated by a strong constriction of the base of the second segment; the first segment is distinctly broader than the half of the width of the second segment; this species forms, nevertheless, a transition between *Nortonia* and *Ancistrocerus*. First tergite (Fig. 108) with two distinct, transverse carinæ. The anterior carina is very sharp and runs at a short distance from the base of the segment; the part in front of it is smooth, very rapidly, nearly vertically sloping towards the articulation of the abdomen; the posterior carina is much less pronounced and placed about on the middle of the total length of the segment; it is somewhat irregularly bordered behind by a row of very deep punctures. Horizontal part of the first tergite nearly as long on its middle line as broad at its posterior margin. Second segment nearly as broad as long, its tergite strongly inflated behind the much depressed base. Second sternite gradually rounded towards its basal furrow which presents a few traces of longitudinal rimples. Apical margin of tergites 1 and 2 forming a very narrow decolorate lamella. At the articulation between the second and first tergites there is an acarid chamber very similar to that of *Nortonia braunsii* Kohl and *Nortonia bisuturalis* (Saussure): the enlarged and inflated basal lamella covers an excavation of the neck of the second tergite; the closed cavity thus formed is filled with mites which may enter the chamber along a median, rather narrow furrow on the basal part of the second tergite (Fig. 108, *a c*).

Punctation strong and very dense on the head; absent from the clypeus; more remote, but coarser on the thorax; the inferior part of the mesopleura with very few punctures. Propodeum very strongly and coarsely reticulate, only the inferior portion of its concavity transversely striate. Tegulæ impunctate, shining. Portion of the first tergite between the two carinæ nearly smooth, with only a few longitudinal rimples near the anterior carina; the surface behind the posterior carina densely and coarsely punctate. Punctation much finer and more remote on the following segments, the punctures becoming stronger and closer towards the apical margin of the second tergite.

Black. Under side of the flagellum, anterior margin of the pronotum, tegulæ, and legs for the larger part, ferruginous-red. The following few markings are pale ivory-yellow: the clypeus nearly entirely; the outside of the mandibles; a frontal spot above the insertion of the antennæ; the under side of the antennal scape; a small dot in the upper part of the temples; an interrupted band on the anterior margin of the pronotum; the posttegulæ; small dots on the flattened tubercles of the postscutellum; narrow apical bands on tergite 1 and on tergite and sternite 2; and spots at the outside of the tibiæ and coxæ. Posterior basitarsus black. Wings hyaline, with a dark brown spot in the apical half of the radial cell.

Length (h. + th. + t. 1 + 2), 7.5 mm.

♀ unknown.

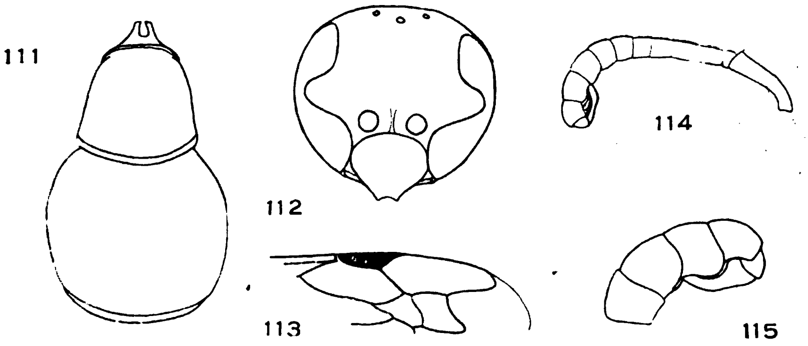
Belgian Congo.— Stanleyville, 1 ♀, April 8, 1915 (Lang and Chapin Coll.).

This species comes in the division *Subancistrocerus* on account of the two carinæ of its first abdominal tergite. It is closely related to *A. massaicus* (Cameron) of which the female alone is known, but I believe it to be distinct, owing to the presence of an acarid chamber at the base of its first tergite.

A. kisangani may prove later on to be a synonym of *Ancistrocerus* (*Subancistrocerus*) *imbecillus* (Saussure) from Sierra Leone; but this species is very superficially known and, since *A. kisangani* possesses an acarid chamber, I think it worth while to fix its identity with a description and drawings.

37. **Ancistrocerus zairensis,** new species

♀.— Head (Fig. 112). Clypeus slightly broader than long; its broad apical margin distinctly, although feebly, arcuately emarginate, without decolorate terminal lamella; with projecting, bluntly rounded angles. The surface of the clypeus feebly convex, slightly depressed on its middle near its apical margin, but without carinæ. Vertex distinctly swollen, with a minute fovea; the posterior ocelli about as far from each other as from the inner margin of the eyes. Temples very broad in their upper half, rather suddenly and strongly narrowed in their inferior half; margined by a very sharp carina which becomes obsolete above and disappears almost entirely behind the vertex. Mandibles beak-like; much shorter than the great ocular diameter; their inner margin with four blunt teeth in front of their moderately curved apex. Antennæ comparatively long; their flagellum feebly and very gradually swollen towards its apical half; their third joint slightly longer than the fourth.



Figs. 111–115. *Ancistrocerus zairensis*, new species.

Fig. 111. Two basal abdominal tergites from above, ♀. Fig. 112. Head in front, ♀. Fig. 113. Venation of front wing, ♀. Fig. 114. Antenna, ♂, seen from above. Fig. 115. Terminal joints of antenna, ♂, from beneath.

Thorax short and heavily built; as seen from above (without the propodeum), slightly longer than broad. Pronotum without carina in front; its anterior margin broadly rounded; its lateral angles not projecting at all; bluntly rounded. Mesonotum distinctly longer on its middle line than its largest width; with short, superficial traces of parapsidal furrows in front of the scutellar suture near its middle line. Scutellum rectangular; nearly flat; with a feeble median depressed line; without spines or lamellæ; its lateral depressions deep, but not used as acarid chambers. Postscutellum transverse; unarmed; not swollen into a ridge nor depressed on its middle line. Mesopleura with a very feeble vertical carina in their anterior part beneath. Propodeum comparatively long; with a distinct horizontal face, which is about as long as the postscutellum and is depressed on the middle line into a saddle-like groove. Posterior face of the propodeum very abrupt; scarcely excavated, except in its terminal part in front of the apical transverse carina where there are two strong depressions separated by a median ridge; no mites were found in these terminal excavations. Lateral, inferior, and superior ridges, as well as lateral angles of the propodeum, not projecting; very gradually rounded. Two broad, decolorate, outwardly curved spines on each side of the articulation of the abdomen. Legs normal; hind coxæ with a strong tooth on their upper face; middle tibiæ with one apical spur; claws deeply bifid at the apex. Wing venation (Fig. 113) of the ordinary *Odynerus* type; the second cubital cell very strongly triangular, its inferior margin very long on the cubitus; the first recurrent ending about as far from the first intercubitus as from the second recurrent, or even farther, the first intercubitus being very oblique; this is apparent in all my specimens (3 ♀ ♀ and 3 ♂ ♂); it is also found, although less distinctly, in many species of *Nortonia*.

Abdomen (Fig. 111) moderately elongate; its first segment comparatively broad; its second segment much inflated, about one and one-half times the width of the first; this species is evidently on the transition towards *Nortonia*. First tergite broadly bell-shaped; with a single, feebly raised transverse carina at a short distance from its base. The part in front of the carina short, almost vertically sloping towards the articulation of the thorax; the horizontal face behind the carina feebly convex, very gradually widening behind, about as long on its middle line as broad at its apical margin. Second segment much inflated on its sides, somewhat flattened on its dorsal and ventral face; slightly broader than long; its sternite gradually, but convexly sloping towards its basal neck, which bears a row of short longitudinal rimples. The basal constricted neck of the second tergite has no acarid chamber, but presents a row of very strong and deep punctures, separated by elongate rimples.

Punctation medium-sized, but very dense on the head and thorax, including tegulæ and propodeum; the clypeus also with very distinct, scattered punctures. The dorsal areas of the propodeum more rugose. Horizontal part of the first tergite of the abdomen about as densely and as strongly punctate as the mesonotum; the second segment with much finer, but still very dense, punctation. The sides of the third, and the apical margin of the fourth and fifth tergites are very minutely punctate. This minute punctation is broadly interrupted on the middle part of the third tergite; but one sees there, at a short distance from the apical margin, a dense group of very strong and deep punctures, which are much stronger than on any other part of the body, and very characteristic. Body covered with fine, silvery pubescence.

Black, with the following ivory-yellow markings: the clypeus except for its apical and lateral margins; a median frontal spot above the insertion of the antennæ; a minute dot on the upper part of the temples; a spot on the outer side of the mandibles; the under side of the antennal scape; a broad anterior margin of the pronotum, interrupted in the middle; a small spot at the base of the tegulæ; the posttegulæ;

a transverse band on the postscutellum; medium-sized apical bands on tergite 1 and tergite and sternite 2; the larger part of the front femora; a spot near the apex of the middle femora beneath; and the tibiæ and tarsi of all the legs. The tarsi are somewhat ferruginous towards their apex, and the terminal joint of the hind tarsi is brownish-black. Some of the yellow markings may be absent (on the tegulæ, posttegulæ, and postscutellum), and the clypeus may also present a large central black spot. Wings hyaline, brownish-dark on the apex of the median and in the apical half of the radial cell.

Length (h. + th. + t. 1 + 2), 6.5 to 7 mm.

♂.— Clypeus very similar to that of the female; its apical margin with a decolorate terminal lamella; its surface distinctly convex, with a few scattered, coarse punctures. Vertex without fovea; temples narrower above than in the female. Mandibles with three teeth in front of their apex along their inner margin. Antennæ (Fig. 114) comparatively long; their third joint distinctly longer than the fourth; joints 7 to 11 strongly inflated; apical margin of joint 9 strongly emarginate on its under side; joints 10 and 11 with a deep longitudinal groove beneath; the terminal hook-like joint (Fig. 115) long, distinctly curved, its blunt and somewhat twisted apex reaching the base of the tenth joint, its base with an expansion on its anterior margin. The remainder (including the characteristic spot of strong punctures on the middle of the third tergite) as in the female; the claws not so deeply bifid.

Coloration also very similar to that of the female; but the clypeus entirely yellow; there is a yellow stripe in the inferior part of the emargination of the eyes and the third tergite has a short yellow apical fascia. The terminal hook of the antennæ and spots at the under side of some of the other joints are dirty yellow.

Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.

Belgian Congo.— Description based on 3 ♀♀ and 3 ♂♂, all from the Lower Congo district: Banana, September 1915, 1 ♀ (holotype), 1 ♂ (allotype), and 1 other ♂ (Lang and Chapin Coll.); Zambi, June 1915, 1 ♀ and 1 ♂, and Thysville, June 1915, 1 ♀ (J. Bequaert Coll.).

38. **Ancistrocerus neavei** (G. Meade Waldo)

This interesting species was described from Mt. Ruwenzori. I collected on the western slopes of the same mountain range (Butagu River, 2500 m., May 15, 1914), four ♂♂ which agree completely as regard structure and sculpture with the original description. This species, however, is also found in the mountainous region between Lake Albert Edward and Lake Kivu, as I have a male from Rutschuru (September 1914) which cannot be separated from the Ruwenzori specimens.

Meade Waldo's key is misleading[1], giving "the median segment (= propodeum) without lateral angles" for this species; the description (p. 500),

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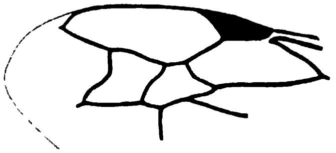
[1] Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

however, states correctly that the median segment has "the sides of the truncation rounded and produced to form blunt lateral tubercles."

The coloration is fairly constant, all my specimens having a narrow anterior yellowish line on the pronotum and broader yellow apical fasciæ on tergite 1 and on tergite and sternite 2; but the clypeus is often nearly entirely yellow, or adorned with a median black longitudinal band.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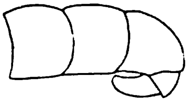
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Figs. 116–117. *Ancistrocerus neavei* (G. Meade Waldo).
Fig. 116. Venation of front wing, ♂.
Fig. 117. Terminal joints of antenna, ♂.

As noted by Meade Waldo, the wings are very ample, this giving a peculiar appearance to the venation (Fig. 116).

Structural differences from the related *Ancistrocerus neuvillei* (R. du Buysson) are not given in the original description. *A. neavei*, *A. neuvillei*, and *A. lineaticollis* P. Cameron are very similar and they may be only color variations of *A. zebra* (Saussure). These four "species" are all found in the mountainous regions of Central Africa (Abyssinia, Ruwenzori, Kivu, Kilimanjaro, etc.). The number of apical bands on the abdominal segments is known to vary in *Ancistrocerus* within the limits of the same species. *A. striativentris* (Cameron) is also related to the preceding, but apparently distinct.

Odynerus Latreille

The classification of the Eumeninæ into genera is a most arduous task, if we attempt to give through it an approximate idea of the evolution of this group. This subfamily includes about 1900 described species, which is more than two-thirds of the total number of known diplopterous wasps. The generic or subgeneric divisions in which it has been proposed to arrange these numerous forms, are, in fact, connected by transitions in almost every direction, so that one might be induced to include all the species in a single genus: *Eumenes* Latreille. Though such a procedure has actually been suggested by so high an authority as H. de Saussure himself, it will not meet with favor among the majority of the students of Hymenoptera; it would, indeed, lead us to bring together such extremes as *Eumenes maxillosus* (de Geer) and *Synagris cornuta* (Linné). Moreover, this method does not permit any further attempt to study the relationship of the species and the true history of the group with reference to its present and past distribution. In cases such as this, I believe that predominance must be given to the phylogenetic factor. As the Eumeninæ seem to be rapidly differentiating at the present time, it may be useful to try to discover some of the very intricate lines along which their evolution is still in progress.

From the phylogenetic point of view it is, however, evident that numerous changes will have to be made in the present classification. Above all, certain genera are entirely artificial, being based on ill-defined or very variable peculiarities of the mouth parts or of the wing venation.

There are undoubtedly certain points in the wing venation of the Eumeninæ which may be used to characterize even the genera, but they have so far not been sufficiently elucidated. I am convinced that the shape of the cubital cells is subject to a great amount even of individual variation within the limits of each species. Such genera as *Alastor* Lepeletier, which are founded exclusively on the presence of a petiolate second cubital cell, are therefore artificial, unless it be proved that they form otherwise natural groups, as seems to be the case for *Paralastor* Saussure and *Alastoroides* Saussure.

The importance of the relative shape of the joints of the maxillary and labial palpi among the Eumeninæ has been much overestimated. It is surprising how slight differences of these organs have been much used among the *Odynerus*-like forms, whereas they have been almost entirely neglected for the *Eumenes*-shaped species. As a result, the classification of the latter group is in a much better condition than that of the former.

I shall not enter into details which do not concern the African species, but I wish to propose the definite suppression of *Rygchium* as a genus distinct from *Odynerus*, since numerous Central African wasps have been referred to *Rygchium*. H. de Saussure, Kohl, and others have pointed out that this genus is so unnatural that the necessity of separating as many species as possible from the large genus *Odynerus* is the only argument for accepting it. The characters which have been used for it reside merely in the shape of the maxillary palpi: in the genotype of *Rygchium*, *Vespa oculata* Fabricius (= *Rygchium europæum* Spinola), the three basal joints are long and slender, whereas the three terminal ones are very short, being together not longer than the third. The typical species of *Odynerus* have the same number of joints (six), but these decrease gradually in length from the basal to the terminal one; the three terminal joints are together longer than the third. How striking these differences between extreme forms are, is easy to see by comparing Fig. 124, maxilla of *O. æstuans* (Saussure), with Fig. 192, maxilla of *O. sheffieldi* Meade Waldo. However, there are, in this respect, numerous transitions among the other species; in fact, most of the authors have neglected to study the mouth parts and have placed in *Rygchium* most of the large-sized solitary wasps with a conical abdomen and the general facies of *Odynerus oculatus* (Fabricius).

In the course of my work on the African collection of the American Museum I have repeatedly tried to arrange the *Odynerus*-like Eumeninæ in natural groups, taking in account the relative length of the joints of the maxillary palpi. But I have always failed and I finally had to give it up when it became apparent that a classification based on this character separates species which are undoubtedly closely related in every other respect.

Bearing in mind the fact that no sharply defined genera can be erected among the Eumeninæ, we may nevertheless attempt to separate the most important natural groups of species. I have defined above *Pachymenes* (p. 87) and *Nortonia* (p. 93) as including all the forms which are distinctly intermediate between the typical *Eumenes* and the *Odynerus*-like solitary wasps. Among the numerous species of the *Odynerus* type, one can recognize two strains which correspond to *Pachymenes* and *Nortonia*. One of them is characterized by the presence of a transverse suture or carina on the first abdominal tergite and has been generally accepted as a subgenus of *Odynerus* under the name *Ancistrocerus* Wesmael; it is of equal rank with *Nortonia* and if we accept the latter as a genus there is no reason why we should not do the same for *Ancistrocerus*. All the other species of *Odynerus* (including *Rygchium*) have no transverse suture on the first tergite and they must form, provisionally at least, a single genus. It has been proposed to subdivide further both *Ancistrocerus* and *Odynerus*, but the suggested divisions seem to me artificial. They are based almost exclusively on the shape and number of the joints of the antennæ, chiefly in the male. Although it is possible that some of these divisions (especially in South America) are natural groups, those occurring in the Ethiopian region can hardly claim more than subgeneric rank.

Key to the Subgenera of *Odynerus* Represented in the Ethiopian Region

Terminal joint of the antennæ in the ♂ folded underneath the apex of the flagellum; narrowed or deformed and more or less hook-shaped.
Subgenus *Rygchium* (Spinola).
Three or four terminal joints of the antennæ in the ♂ elongate and narrowed; rolled up in spiral fashion.....................Subgenus *Odynerus, sensu stricto.*

Of the 221 species which have been recorded from the Ethiopian region, after elimination of the most obvious synonyms, 185 belong to *Rygchium*, and only 11 to *Odynerus, sensu stricto;* the remaining 25 species are so unsatisfactorily described that it is impossible to bring them into the subgenera to which they belong.

It must be remembered that I have transferred to *Pachymenes* several species which were formerly included in the subgenus *Rygchium* (= *Leionotus*) of *Odynerus*. Species with narrowed first abdominal segment must, therefore, be looked for in *Pachymenes*.

Ethology. Réaumur[1] gives an interesting account of the nesting habits of *O. reniformis* (Gmelin) and, since his time, various writers have contributed many details to the life history of this genus. Some 60 species of *Odynerus* have been more or less completely studied in this respect, but most of the observations relate to forms from the Palearctic region.

Although all of the species keep true to the solitary habits, their instincts show considerable plasticity. There is, in the location of the nest especially, a great variability. Some species, such as the common European *A. parietum* (Linné), seem to adopt almost any suitable cavity. Often there is a marked preference for galleries, which the female burrows herself or finds ready for use, in stalks, reeds, dry wood, in cavities of stones, in empty snail shells, etc. In all such cases, the partitions between the cells and also the wall closing the entrance to the nest are made of mud, masoned with saliva and water; sometimes complete clay cells are built inside these cavities. Numerous species burrow directly in clayey or sandy soil and very often the entrance to the nest is then surmounted by a clay chimney. Some of the larger *Odynerus* build free mud cells, either isolated or aggregated into lumps, and fixed on twigs of shrubs, or on stones; such species are apt to use empty mud nests of other Hymenoptera.

The egg is always laid in the bottom of the cell before the prey is brought in; it may be free or hang down from a silky thread. In most of the species, the female accumulates the prey hastily in the cell and walls it up before the egg hatches; however, at least in one instance (*O. tropicalis* Saussure), the mother wasp is known to feed her larva from day to day until it is full-grown.

The prey consists, in most cases, of lepidopterous, sometimes of coleopterous larvæ; these are, as a rule, paralyzed by a sting, exceptionally they are partly crushed by the mandibles. In a few instances it has been recorded that species of *Odynerus* store larvæ of saw-flies.

The ethology of the following African species is at least partly known: *O. marginellus* (Fabricius), *O. anceps* (Gribodo), *O. auro-maculatus* (Saussure), *O. hyacintæ* Gribodo, *O. hottentotus* Saussure, *O. falcatus* Tullgren, *O. bellatulus* Saussure, and *O. tropicalis* Saussure. More details of the habits of some of them can be found in this paper.

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[1] Mémoires pour servir à l'histoire des Insectes, VI, Paris, 1742, p. 251.

Subgenus **Odynerus**, *sensu stricto*

(= *Oplopus* Wesmael, *Oplomerus* Westwood, *Hoplomerus* Thomson.)

Eleven African species have been referred to this subgenus, the type species of which is *Odynerus spinipes* (Linné). Several of them, however, are only known in the female sex and, since the subgenus is almost exclusively characterized by the shape of the male antennæ, the knowledge of the African *Odynerus*, *sensu stricto* is still in a very unsatisfactory condition.

The only species recorded from the Belgian Congo is *Odynerus adonis* G. Meade Waldo, from the Katanga (Lufira River). It is placed by its author in *Odynerus*, *sensu stricto* (= *Hoplomerus*), though the male is unknown. I have not seen that species. It is described as being black, with yellow spots on head, thorax, basal abdominal segment, and apical margin of first and second tergites; and also with the first and second tergites and the legs for the most part ferruginous. Vertex with golden, and propodeum with ivory-white, pubescence. Wings golden hyaline. Propodeum slightly concave. Length (h. + th. + t. 1 + 2), 16 mm.[1]

The transition between the subgenus *Odynerus*, *sensu stricto*, and the subgenus *Rygchium* is very gradual. Some of the African species have the male antennæ so shaped as to be intermediate between these two groups. Such are: *O. andreanus* Saussure, described as having the male antennæ "un peu recoquillées à l'extrémité et terminées par un crochet obtus,"[2] *O. angolensis* Radoszkowsky (p. 135), *O. picturatus* n. sp. (p. 137), and others. I have included these all in the subgenus *Rygchium*.

Subgenus **Rygchium** (Spinola)

(= *Leionotus* H. de Saussure; *Lionotus*, *auct.*)

In the key given in this paper, I have tried my best to avoid characters based on the coloration, because they are absolutely misleading. Notwithstanding this warning, some students may still attempt to name species after some striking color markings. For this reason, I present here a grouping of some of the most common color combinations found among the African species of *Odynerus* and I have included the similarly colored species of the genus *Synagris*. I hope that these lists, which are far from complete, will sufficiently prove how little use can be made of the coloration for an exact identification of the species.[1]

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[1] Compare my remarks on *Pterochilus versicolor* A. v. Schulthess, p. 194.

[2] H. de Saussure, in Grandidier, Hist. nat. Madagascar, XX, pt. 1, Hym., 1890, p. 168; R. du Buysson, Ann. Soc. ent. France, LXIX, 1900, p. 178, figs. 10 and 11.

I. Group of *Synagris crassipes* Kohl.— Body almost entirely of uniform black color. At most a few ferruginous tinges on head, antennæ, tegulæ, and legs; or, in the male, the clypeus and spots on the face yellowish.

* *Synagris crassipes* Kohl.
  " *aterrima* Maidl.
* " *cornuta* (Linné) var. *similis*, new variety.
  " *similis* Maidl.
Odynerus holomelas (Ed. André).
  " *junodianus* (A. v. Schulthess).
  " *fallax* (Saussure).
  " *luctuosus* (Gerstæcker).
  " *lugubris* Meade Waldo.
  " *madecassis* (Saussure).
  " *melanchrous* Kohl.

II. Group of *Synagris calida* (Linné).— Abdomen black; with the apical segments, from the third or fourth on, bright orange-yellow or orange-red, often with golden pubescence. Thorax and head black, or more or less tinged with ferruginous.

* *Synagris abyssinica* Guérin.
* " *analis* Saussure.
* " *calida* (Linné).
  " *carinata* Saussure.
  " *elephas* Ern. André.
* " *kohli* Maidl.
  " *maxillosa* Saussure.
  " *negusi* R. du Buysson.
* " *spiniventris* (Illiger).
  " *spinosuscula* Saussure.
  " *vicaria* Stadelmann var. *luteopicta* Maidl.
* *Odynerus anceps* (Gribodo).
  " *ardens* Guérin.
  " *forticulus* (Kohl).
  " *incensus* (Gribodo).
  " *magrettii* (Gribodo).
  " *natalensis* Saussure.
  " *sirdari* (Morice).

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[1] Species of which I have seen specimens are marked with an asterisk; the others are included in the lists after their descriptions.

* *Odynerus synagroides* (Saussure).
* " *ventralis* Saussure.
" *xanthurus* Saussure.

III. Group of *Synagris mirabilis* Gerstæcker.— Head and thorax black; antennæ, clypeus, and mandibles more or less tinged with ferruginous. Abdomen black, with the three or four apical segments entirely or partly white or ivory-white.

* *Synagris abyssinica* Guérin var. *albofasciata* Maidl.
* " *mirabilis* Gerstæcker.
" *proserpina* Gribodo.
" *vicaria* Stadelmann.
Odynerus junodi (Gribodo).
" *lacuum* (Stadelmann).

IV. Group of *Synagris æstuans* (Fabricius).— Abdomen black, with conspicuous, but small, ivory-white or yellowish-white, rounded spots, at least on tergites 1 and 2 — sometimes on nearly all the tergites. Legs, antennæ, clypeus, pronotum, propodeum, ventral side of the thorax, and base of the abdomen more or less extensively ferruginous-red. The thorax also may present ivory-white rounded spots.

* *Synagris æstuans* (Fabricius).
" *huberti* Saussure.
" *ornatissima* Maidl.
" *versicolor* A. v. Schulthess var. *meade-waldoi* Maidl.
* *Odynerus æstuans* (Saussure).
* " *osborni*, new species.

V. Group of *Synagris cornuta* (Linné), typical form.— Head for the most part, thorax except for the mesonotum, legs, and basal part of the first abdominal segment ferruginous-red. Mesonotum and remainder of the abdomen black.

* *Synagris cornuta* (Linné), typical form.
* " *huberti* Saussure var. *clypeata* (Mocsáry).
* " *rufopicta* Tullgren.
* " *versicolor* A. v. Schulthess.
Odynerus inermis (Mocsáry).
" *mephisto* (Gribodo).
" *niloticus* (Saussure).
* " *rufoniger*, new species.
" *uncatus* (Tullgren).

VI. Group of *Odynerus carinulatus* Saussure.— Abdomen entirely, or at least on its dorsal face, bright orange-brown or yellow, often covered with golden pubescence. Head and thorax black, more or less suffused with ferruginous, sometimes with yellow or whitish spots.

Odynerus bairstowi Gribodo.
" *bothriogaster* Schletterer (? = *carinulatus* Saussure).
* " *carinulatus* Saussure.
" *caviventris* Kirsch.
* " *emeryanus* Gribodo (= *benitensis* A. v. Schulthess).
* " *ferruginatus* J. Bequaert (= *ferrugineus* A. v. Schulthess).
" *guerinii* Saussure (= *æstuans* Saussure).
" *guineensis* Saussure, 1858.[1]
* " *hyacintæ* Gribodo (? = *Vespa aurata* Fabricius).
" *meade-waldoi* J. Bequaert (= *deceptor* Meade Waldo).
" *politiclypeus* A. v. Schulthess.
" *signatus* Saussure.
* *Rhynchalastor fuscipennis* Meade Waldo.
" *xanthosoma* (Schletterer).

Odynerus chrysomallus (Schletterer) is described as having the dorsal part of the abdomen covered with dense golden pubescence, but the ground color is said to be black.

VII. Group of *Odynerus marginellus* (Fabricius).— Abdomen black or brownish, with two conspicuous yellow lateral bands. Thorax and head more or less black and brown.

* *Odynerus gestroi* (Gribodo).
* " *lateralis* (Fabricius).
* " *marginellus* (Fabricius).
* " *pseudolateralis* Meade Waldo.

The following species, belonging to the subgenus *Rygchium*, have been previously recorded from the Belgian Congo. They were not represented in the collection which was used in preparing the present paper and, since the descriptions of most of them are very incomplete, it has not been possible to include them all in the key.

Odynerus bothriogaster Schletterer.— Equator, Congo.[2]
" *chrysomallus* (Schletterer).— Equator, Congo.[3]
" *goniodes* Schletterer — Equator, Congo.[4]
" *politiclypeus* A. v. Schulthess.— Bunkeya (Katanga)[5]; has been included in the key.

Odynerus schubotzianus (A. v. Schulthess).— Upper Ituri.[6] See the footnote in the key, p. 134.

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[1] *Odynerus guineensis* Saussure, 1863, is a completely different wasp.
[2] A. Schletterer, Ann. Soc. entom. Belgique, XXXV, 1891, p. 27.
[3] A. Schletterer, Ann. Soc. entom. Belgique, XXXV, 1891, p. 23.
[4] A. Schletterer, Ann. Soc. entom. Belgique, XXXV, 1891, p. 25.
[5] A. v. Schulthess, Soc. entom., XXIX, 1914, p. 73.
[6] A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp. 1907-08, IV, Zool., II, pt. 10, 1912, p. 293.

Odynerus versicolor (Kirby).— According to A. v. Schulthess,[1] *O. wellmani* Meade Waldo and *O. stiraspis* Cameron are synonyms of this species; the same author brings *O. stiraspis* Cameron in the group of *O. floricola*, with postscutellum and propodeum rounded ;[2] the abdomen is said to be impunctate. Meade Waldo[3] brings *O. wellmani* among the species without lateral tubercles on the postscutellum; whereas *O. stiraspis* is found twice in his key: once in the same group as *O. wellmani* and also in the group of species with tuberculate postscutellum. *O. wellmani* Meade Waldo has been recorded from the Lualaba River, Katanga.[4]

Key to the Congo Species of *Odynerus*, Subgenus *Rygchium*

G. Meade Waldo has recently published a key to the species of *Odynerus* occurring in the Ethiopian region.[5] However, this attempt does not seem to be very successful; the characters given are to a great extent based on the color markings and there are also other defects which render this key unsatisfactory.

1. Mesonotum with two longitudinal carinæ or raised lines, which are sometimes rather inconspicuous. Postscutellum prominent; with a short horizontal and a much longer vertical portion, the transverse ridge between them raised, presenting on each side a lateral crenulate tubercle and on its middle a projecting tooth, which is the termination of a more or less distinct longitudinal carina..2.
   Mesonotum without any trace of longitudinal carinæ or raised lines. The postscutellum not trituberculate and not of the shape described above....4.
2. Mesonotum with only two very conspicuous, raised carinæ, which converge slightly posteriorly but do not reach the scutellum. Clypeus distinctly emarginate at its apex with projecting lateral edges. Abdomen mostly impunctate but with a transverse area of coarse punctures near the apical margins of tergites 2, 3, and 4. Middle femora in the ♂ only slightly depressed on their anterior face in their basal half. Second sternite with a deep, saddle-like depression, margined by strong longitudinal ridges. Head, thorax, and legs dark brownish-ferruginous, with indistinct black spots; the abdomen uniformly orange-chrome. Clypeus of the ♂ yellowish-white. Length (h. + th. + t. 1 + 2); ♀, 11 to 13 mm.; ♂, 8.5 to 10 mm.
   O. carinulatus Saussure.
   Clypeus broadly truncate at its apex in both sexes. Abdomen uniformly punctate all over. Anterior face of the middle femora in the ♂ with a strong

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[1] Soc. entom., XXIX, 1914, p. 57.

[2] Ark. f. Zool., VIII, No. 17, 1913, p. 17.

[3] Trans. Entom. Soc. London, (1914), pt. 3-4, 1915, pp. 490-498.

[4] G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VI, 1910, p. 106.

[5] G. Meade Waldo, A revision of the species of the genus *Odynerus* occurring in the Ethiopian region. Trans. Entom. Soc. London, (1914), pt. 3-4, 1915, pp. 485-520, Pl. xci.

basal depression bordered by a ridge. Black, with indefinite ferruginous tinges on head, thorax, and legs; terminal abdominal segments bright orange-brown. Clypeus at least partly ferruginous in the ♂..................3.

3. Mesonotum with two longitudinal, distinct, raised lines, somewhat carina-like and converging towards the scutellum; often also with a shorter, more or less developed, third raised line on its middle. Second sternite with a deep saddle-like depression, margined by strong ridges, which suddenly slope towards the base of the segment. Projecting part of the middle femora, ♂, situated about their middle. Hook of the antennæ, ♂, (Figs. 147 and 148) long, heavy, and twisted at its apex. Length (h. + th. + t. 1 + 2): ♀, 17 to 20 mm.; ♂, 15 to 18 mm...................*O. ventralis* Saussure.

Two raised longitudinal lines on the mesonotum, much less distinct than in *O. ventralis*, the median line very feeble or obsolete. Second sternite with a shallow median depression, the lateral ridges being low and very gradually sloping towards the base. Projecting part of the middle femora, ♂, situated on their basal third. Hook of the antennæ, ♂, (Fig. 160) shorter, not twisted, somewhat spatulate. Length (h. + th. + t. 1 + 2): ♀, 14 to 17 mm.; ♂, 12 to 14 mm..........................*O. anceps* (Gribodo).

4. Mesonotum distinctly punctate in its anterior half; its posterior half, scutellum, and tegulæ smooth and shining, almost without sculpture. Scutellum plane. Postscutellum with a broad, but short anterior face, which is feebly depressed towards its middle and raises on each side into a feeble, blunt tubercle. Inferior margin of propodeum with a row of digitiform teeth. Apex of the clypeus in the ♀ narrow, almost truncate, with two short carinæ; in the ♂ very feebly emarginate, without carinæ. Abdomen distinctly punctate all over..5.

Mesonotum and scutellum almost uniformly punctate all over, at least not divided into a distinct anterior punctate and posterior smooth part. The structure of the postscutellum also different..........................6.

5. Body with an abundant short pubescence, which is deep black on vertex, pronotum, and mesonotum; grayish or silvery-white on the rest of the body; the abdomen covered with a distinct, silvery bloom. In the var. *sabulosus* (Saussure), body almost entirely black, without yellow markings; head, tegulæ, and legs partly ferruginous. Length (h. + th. + t. 1 + 2), ♀, 15 mm....................................*O. cyanopterus* (Saussure).

Body almost naked or scarcely pubescent; the abdomen without silvery bloom. In the typical form the head, thorax and legs are extensively marked with ferruginous-red; the abdomen is black with two conspicuous yellow lateral bands on its dorsal face. Length (h. + th. + t. 1 + 2): ♀, 12.5 to 15 mm.; ♂, 9 to 14 mm............................*O. marginellus* (Fabricius).

6. Middle femora in both sexes (Fig. 173) with a distinctly swollen expansion on their anterior margin in their apical third, as seen from above. Mandibles in the ♂ with a heavy tooth-like lamella on their inner margin near their base. Apical joints of the antennæ in the ♂: Fig. 172. Head, thorax, and legs black; the postscutellum in both sexes and the clypeus in the ♂, yellow or ivory-white; the abdomen orange-brown, densely covered with bright golden tomentum. Length (h. + th. + t. 1 + 2), ♀ and ♂, 11 mm. *O. hyacintæ* Gribodo.

Middle femora not with an apical expansion on their anterior margin. Species otherwise different ..... 7.

7. Propodeum with a distinct, although often short, horizontal area behind the postscutellum; the postscutellum not bordering the concavity of the propodeum. This horizontal area is more or less fissurate on its middle line .... 8.

Propodeum without any horizontal area behind the postscutellum; the postscutellum itself bordering the concavity of the propodeum in front ...... 10.

8. ♂ unknown. ♀.— Clypeus flat, shining, impunctate, truncate at its apex. Thorax blackish-brown; abdomen almost entirely orange-brown, nearly impunctate. Length (h. + th. + t. 1 + 2), 12 mm.[1]
O. politiclypeus A. v. Schulthess.

Clypeus distinctly sculptured in the ♀. Abdomen distinctly punctate. Coloration very different ..... 9.

9. Clypeus piriform, almost of the same shape in ♀ and ♂, its apical margin broadly truncate, very feebly sinuate on its middle; its apical half with two longitudinal carinæ, which are more pronounced in the ♀ than in the ♂. Propodeum very long, with a deep and distinct concavity, its inferior ridge with a row of deeply cut teeth. Second sternite feebly depressed on its middle. Hook of antennæ ♂: Fig. 219. Black; head and thorax tinged with ferruginous-red; no yellow markings; clypeus of ♂ ferruginous. Length (h. + th. + t. 1 + 2): ♀, 10.5 to 11.5 mm.; ♂, 9 to 11 mm.
O. histrionimimus, new species.

♀ unknown. ♂.— Clypeus transverse, with truncate apical margin, without longitudinal carinæ. Propodeum comparatively short, its inferior ridge feeble, without a row of teeth. Second sternite convex on its middle. Hook of antennæ ♂: Fig. 225. Black, with a few ferruginous tinges and distinct yellow apical bands on tergites 1 and 2; clypeus yellow. Length (h. + th. + t. 1 + 2), 6.5 mm ..... *O. rhizophorarum*, new species.

10. Postscutellum with sharply projecting lateral tubercles or spines .... 11.

Postscutellum without projecting tubercles, teeth, or carinæ; either flat, or convexly rounded, or swollen into a transverse ridge, which may be sharp, rounded, or crenulate and is often depressed on its middle so as to present two rounded protuberances ..... 13.

11. Basitarsus of the hind legs in the ♂ with a distinct expansion on its inner side. Postscutellum, ♀ and ♂, with small, transverse tubercles, which are flattened from behind. Scutellum flat, with a very feeble elevation on each side in its hind angles. Second abdominal tergite often with a trace of a longitudinal median ridge, or slightly raised on its middle line. Dorsal areas of the propodeum punctate, but not reticulate ..... 12.

Basitarsus of the hind legs in the ♂ normal, straight along its inner side. Postscutellum, ♀ and ♂, with rather long and sharp lateral teeth, which are somewhat flattened from the sides; the scutellun often with lateral carinæ or spines. Second abdominal tergite convexly rounded above, without any trace of a median ridge. Punctation of the clypeus strong; the clypeus, however, not distinctly striate in the ♀. Dorsal areas of the propodeum rugosely reticulate. Coloration variable. Length (h. + th. + t. 1 + 2): ♀, 6.5 to 8 mm.; ♂, 5 to 7 mm ..... *O. tropicalis* Saussure.

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[1] After A. v. Schulthess.

12. Clypeus, ♀ and ♂, nearly impunctate. Basitarsus of the hind legs, ♂, (Fig. 207) with a rather strong expansion before its middle. Antennal hook ♂: Fig. 206. Punctation coarse on the thorax, much finer on the head. Length (h. + th. + t. 1 + 2): ♀, 6.5 mm.; ♂, 6 mm...*O. kabarensis*, new species.
Clypeus, ♀, with scattered, strong punctures, giving its surface a substriate appearance; distinctly punctate in the ♂. Basitarsus of the hind legs, ♂, (Fig. 212) with a feeble expansion about its middle. Antennal hook ♂: Fig. 211. Punctation uniformly coarse on head and thorax. Length (h. + th. + t. 1 + 2): ♀, 6.5 to 7 mm.; ♂, 6.5 mm.
O. chapini, new species.

13. Superior ridges of the propodeum sharp, somewhat carina-shaped; its lateral and inferior ridges, as also its blunt lateral angles, well marked; its dorsal areas almost entirely taken by a smooth impunctate, shining spot; its concavity transversely striate. Postscutellum with a short horizontal and a much longer vertical part, both being separated by an almost straight, finely crenulate ridge; a slight notch separates this ridge from the superior ridge of the propodeum. First and second abdominal tergites with a few distinct, but very scattered punctures in their posterior half; those on tergites 3 and 4 denser. Shape of the clypeus in ♀ and ♂, and of the antennæ in the ♂, the same as in *O. lateralis* Fabricius. Coloration black and white; see p. 179. Length (h. + th. + t. 1 + 2): ♀, 10 to 11 mm.; ♂, 7.5 to 9 mm.........*O. falcatus* Tullgren (= *14-maculatus* A. v. Schulthess).
Superior, lateral, and inferior ridges of the propodeum, as also its lateral angles, convexly rounded and indistinct; if sharp, then the dorsal areas of the propodeum uniformly sculptured, without smooth space. Punctation of the two first abdominal tergites also different — either practically absent, or much denser..14.

14. Abdominal tergites 1 and 2 practically impunctate; at most the second tergite with very few scattered punctures on its posterior part or on its sides...15.
Abdominal tergites 1 and 2 distinctly punctate all over, often with a zone of strong and dense punctures in their apical part; sometimes the punctation hidden beneath a covering of short pubescence. Dorsal areas of the propodeum uniformly sculptured, without smooth space....................21.

15. Clypeus, larger part of the front, and often also vertex practically without strong sculpture, impunctate, dull in both sexes; at most, traces of punctures in the apical half of the clypeus....................................16.
Clypeus, front, and vertex distinctly punctate in both sexes, the sculpture of the clypeus more coarse in the ♀ than in the ♂. Antennæ of the ♂ with their terminal joint always hook-shaped, short and straight............19.

16. Antennæ of the ♂ not very elongate; not rolled up at their apex (Fig. 187); their last joint hook-like, straight. Apical margin of the clypeus, ♀ and ♂, very feebly, arcuately emarginate; its angles without sharp carinæ......17.
Antennæ of the ♂ elongate; somewhat rolled up at their apex; their last joint long and strongly curved (Figs. 119 and 122). Apical margin of the clypeus in the ♀ (so far as known) deeply emarginate, with sharply carinate angles. 18.

17. Punctation of the thorax very superficial, more distinct on the posterior part of the scutellum; the mesonotum dull, almost without visible sculpture.

Temples and emargination of the eyes also impunctate; the second sternite with very minute punctures. Length (h. + th. + t. 1 + 2), 8 to 10 mm. *O. bellatulus* Saussure.

Thorax uniformly covered with strong, although distinctly separated punctures; temples and emargination of the eyes with a few punctures. Second sternite strongly punctate. Clypeus ♀: Fig. 185; and ♂: Fig. 184. Hook of antennæ ♂: Fig. 187. Length (h. + th. + t. 1 + 2): ♀, 10 mm.; ♂, 8 mm. *O. ueleensis*, new species.

18. ♀ unknown. ♂.— Apical margin of the clypeus broad, truncate, very feebly sinuate, its terminal angles being very bluntly rounded (Fig. 123). Mesonotum with coarse, distinct punctation all over. Length (h. + th. + t. 1 + 2), 9.5 mm....................................*O. picturatus*, new species.

Apical margin of the clypeus in both ♀ and ♂ deeply, semicircularly, or triangularly emarginate, with rather sharp angles (Figs. 118 and 121). Mesonotum dull; with superficial, scattered punctures. Length (h. + th. + t. 1 + 2): ♀, 12 mm.; ♂, 10 to 12 mm.....*O. angolensis* Radoszkowsky.

19. Inner margins of the eyes about as far from each other on the vertex as on the clypeus; the posterior ocelli slightly more remote from each other than from the inner margin of the eyes. Vertex, ♀, with a broad, densely hairy fovea. Clypeus, ♀, with very strong, almost rugosely striate sculpture on its middle; in the ♂ deeply, semicircularly emarginate at its apex. Postscutellum very sharply divided into a horizontal and a vertical part, the ridge separating both strongly marked, almost straight, crenulate. Lateral, superior, and inferior ridges of the propodeum rather strongly convex; its lateral angles also distinct; its superior ridge separated from the ridge of the postscutellum by a feeble notch. Coloration variable. Length (h. + th. + t. 1 + 2): ♀, 9.5 to 11 mm.; ♂, 7 to 9.5 mm.............*O. lateralis* Fabricius.

Inner margins of the eyes distinctly more remote on the vertex than on the clypeus; posterior ocelli about as far from each other as from the inner margin of the eyes. Vertex, ♀, with a small, feebly hairy fovea. Clypeus, ♀, with much feebler sculpture; in the ♂ (so far as known) very feebly emarginate at its apex. Postscutellum convexly pillow-shaped, with a median, arcuately curved, crenulate ridge. Ridges of the propodeum very gradually sloping, its lateral angles rounded, almost indistinct..........20.

20. ♂ unknown. ♀.— Apical margin of the clypeus slightly, although distinctly, arcuately emarginate, with sharp lateral edges in which end fine longitudinal carinæ. Postscutellum with a distinct and regular, arcuate and crenulate, raised line. Dorsal areas of the propodeum almost gradually sloping towards its concavity. Second abdominal sternite almost flattened towards its base. Coloration black, with ivory-white markings; a free lateral spot near the base of the second tergite; with very few ferruginous tinges. Length (h. + th. + t. 1 + 2), 9.5 to 10.5 mm.........*O. alboniger*, new species.

Apical margin of the clypeus only very slightly sinuate, with bluntly rounded edges, which are hardly carinate. Raised, crenulate line of the postscutellum less distinct; the dorsal areas of the propodeum still distinctly separated from its concavity. Second abdominal sternite convexly rounded at its base. Coloration black, with abundant ferruginous tinges and pale yellow markings; no free lateral spot on the second tergite. Length (h. + th. + t. 1 + 2): ♀, 9 to 10 mm.; ♂, 7.5 to 8 mm.......*O. desperatus*, new species.

21. Lateral, superior, and inferior ridges of the propodeum indistinct; its lateral angles also broadly rounded; its inferior ridges never crenulate. Clypeus broadly truncate at its apex, at most very slightly sinuate in the ♂. Medium-sized species of the ordinary *Odynerus* shape. Length (h. + th. + t. 1 + 2). scarcely over 10 mm..22.

The ridges and lateral angles of the propodeum more or less distinct; often the superior ridges carina-like; or the inferior ridges are crenulate, with long, digitiform teeth, or with a recurved spine. Species often over 10 mm. long. 24.

22. Clypeus broader than high, shining, with very scattered and minute punctures, without striæ. Second abdominal sternite uniformly convex towards its base, without a median furrow. Head and thorax black, with a few ivory-yellow markings; abdomen and the greater part of the legs ferruginous-red, without yellow markings..........................*O. emeryanus* Gribodo.

Clypeus either coarsely punctate, or distinctly higher than broad. Second abdominal sternite with a distinct, longitudinal furrow in the middle of its basal, convex part. Variously colored with black and ferruginous; with abundant yellow markings, forming spots on head and thorax, transverse bands and often also isolated spots on the abdomen....................23.

23. Clypeus about as broad as high, feebly convex, uniformly and densely covered with coarse punctures. Punctation of head, thorax, and abdomen also stronger and denser than in the following species, especially on the dorsal areas of the propodeum and the second sternite. Hook of the ♂ antennæ short and scarcely curved (Fig. 195). Coloration probably variable. *O. congolensis*, new species.

Clypeus distinctly higher than broad, slightly flattened towards its apex, with scattered punctation in its upper part; its flattened, inferior part being shining, only feebly punctate and somewhat striate. Second tergite with feeble punctures all over and a preapical zone of stronger pits; the second sternite with feeble, scattered punctation. Hook of the ♂ antennæ long, distinctly curved on its middle, and slightly twisted. Coloration variable. *O. sheffieldi* G. Meade Waldo.

24. ♂ unknown. ♀.— Superior ridges of the propodeum convexly rounded; almost without separation between its dorsal areas and its concavity. Post-scutellum transversely triangular, pillow-shaped; regularly sloping from its base to its apex; without distinct transverse ridge; uniformly rugose all over. Teeth on the inferior ridges and lateral angles of the propodeum, feeble; however, two strong recurved spines above the valvula, near the articulation of the abdomen (Fig. 175). Clypeus, ♀: Fig. 174. Coloration much as in *S. cornuta* (typical form): black, with head, thorax, legs and first abdominal segment extensively ferruginous-red. Length (h. + th. + t. 1 + 2), 13 to 14 mm..*O. rufoniger*, new species.

Superior ridges of the propodeum distinct, forming a fine raised line, a sharp carina, or a lamella. Postscutellum more or less distinctly divided into a horizontal, anterior and a vertical or sloping, posterior portion. No strong, recurved spines above the valvula near the articulation of the abdomen..25.

25. Superior ridge of the propodeum lamelliform, with a projecting upper angle, which is separated by a deep notch from the well marked, transverse, crenu-

late ridge of the postscutellum. Clypeus, ♀ and ♂, with a narrow, very feebly sinuate apical margin; in the ♀ uniformly covered with dense irregular striæ; in the ♂ coarsely punctate. Second sternite not depressed on its middle; with a distinct, longitudinal, basal furrow. Medium-sized species, rarely over 10 mm. long (h. + th. + t. 1 + 2)........................26.

Superior ridge of the propodeum more or less distinct, never lamelliform, the notch between it and the transverse ridge of the postscutellum very feeble or absent, not followed by a projecting angle. Second sternite often depressed on its middle; never with a distinct, basal, longitudinal furrow. Larger species; rarely under 10 mm. long; *Synagris*-like[1]....................27.

26. Coloration much as in *O. lateralis* and *O. marginellus*. In the only ♀ specimen seen, body almost entirely ferruginous-brown, with a broad, continuous, yellow stripe on each side of the dorsum of the abdomen. Tegulæ mostly whitish. Wings subhyaline, with a yellowish tinge in their basal half, purplish-black in their apical half. Length (h. + th. + t. 1 + 2), ♀, 9 mm.
O. pseudolateralis G. Meade Waldo.

♀ Coloration much as in *Synagris cornuta* (typical form) and *O. rufoniger:* black; with the larger part of the head, antennæ, pronotum, scutellum, postscutellum, upper part of propodeum, spots in the upper half of the mesopleura, tegulæ, sides of tergite 1, apex of abdomen, and legs, ferruginous-red; second tergite with an apical whitish band, broadly interrupted on its middle. Rarely the first or third tergites also whitish in their apical angles. The ♂ similar, but the clypeus and a broad spot on the front are pale yellow. Wings yellowish and purplish-brown as in the preceding species. Length (h. + th. + t. 1 + 2): ♀, 10 to 11 mm.; ♂, 8 to 9 mm.
O. meyeri var. *albolimbatus* A. v. Schulthess.

27. ♀ and ♂.—Postscutellum very rugosely reticulate; its rounded transverse ridge strongly crenulate. Second sternite flattened or feebly depressed on its middle. Clypeus, ♀, with its apical margin very narrow, feebly, although distinctly, arcuately emarginate, with projecting, strongly carinate edges; its whole surface rugosely punctate. Clypeus, ♂, deeply semicircularly emarginate, with sharp teeth-like edges, its surface very minutely sculptured. Hook of antennæ, ♂: Fig. 136. Middle femora, ♂, flattened in their basal third on their inner side (Figs. 141 and 142). Black, clypeus ferruginous, terminal abdominal segments bright chrome-orange. Length (h. + th. + t. 1 + 2): ♀, 15 to 19 mm.; ♂, 9 to 15 mm.......*O. synagroides* (Saussure).

♀ (♂ not seen).— Clypeus with narrowly truncate, very feebly sinuate apical margin (Fig. 126) and broadly rounded edges. Postscutellum feebly, rugosely punctate; its transverse ridge indistinct or minutely crenulate. Coloration very different..28.

28. Second abdominal sternite with a broad, shallow, median depression, margined by convexly rounded elongate ridges. Postscutellum almost without trans-

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[1] According to the description, *O. schuboltzianus* (A. v. Schulthess) is a large-sized, *Synagris*-like species (Length: ♀, 16 mm.; ♂, 13 mm., to the apex of tergite 2), with a very high, crenulate lamella along the inferior ridge of the propodeum; clypeus as broad as (♂) or broader than (♀) long, with broadly truncate, scarcely sinuate apical margin. Body entirely black; the front wings fusco-violaceous in their anterior half, hyaline in their posterior half; the hind wings hyaline. Second sternite deeply depressed on its middle.

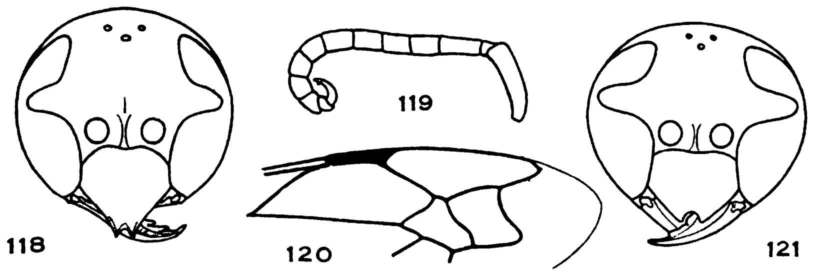
verse ridge; convexly rounded between its horizontal and its sloping portion. Dorsal areas of the propodeum coarsely punctate, almost rugosely reticulate. Black; clypeus, antennæ, pronotum, pleura, propodeum, base of the first segment, and legs ferruginous-red; bright ivory-white spots on front, sides of pronotum, tegulæ, postscutellum, and sides of tergites 1 and 2. Length (h. + th. + t. 1 + 2), ♀, 16 to 18 mm...........*O. æstuans* (Saussure).

Second abdominal sternite only slightly flattened on its middle; without a distinct depression. Postscutellum with a distinct transverse ridge separating its anterior, horizontal from its posterior sloping part; the latter almost vertical. Dorsal areas of the propodeum finely rugulose. Black; clypeus, antennæ, pronotum, tegulæ, legs, and spots on the mesopleura ferruginous-red; regular, rounded, whitish spots on front, posttegulæ, dorsal areas of propodeum, and sides of tergites 1 to 5. Length (h. + th. + t. 1 + 2), ♀, 13 mm.....................................*O. osborni*, new species.

39. **Odynerus (Rygchium) angolensis** Radoszkowsky

I refer to this species 2 males and 1 female from the Lower Congo; the female agrees fairly well with the very short original description.

♀.— Head: Fig. 118. Clypeus nearly as broad as high; its apex deeply, arcuately emarginate, with two strong, but short longitudinal carinæ ending in its apical edges. Front only feebly raised between the insertion of the antennæ. Vertex broad; with a small median, bare fovea; margined behind. Temples broad; margined by a very sharp carina. Mandibles about as long as the great ocular diameter; with four blunt teeth in front of their slightly curved apex. Antennæ elongate; strong; slightly swollen towards their apex; their third joint long, more than one and one-half times as long as the fourth. Posterior ocelli slightly nearer to each other than to the inner margin of the eyes.



Figs. 118–121. *Odynerus angolensis* Radoszkowsky.

Fig. 118. Head in front, ♀. Fig. 119. Antenna, ♂. Fig. 120. Venation of front wing, ♀. Fig. 121. Head in front, ♂.

Thorax distinctly longer than broad or high. Anterior margin of the pronotum truncate; with a narrow, raised carina; its lateral angles rounded, only the carina projecting as a minute spine. Mesonotum without parapsidal furrows. Scutellum broad; flat; with a median longitudinal, slightly raised, smooth line. Postscutellum convex; pillow-like; with a curved feeble, transverse, decolorate carina, which is somewhat emarginate on its middle; the whole of the postscutellum being depressed into a median saddle, so as to be divided into two, broadly rounded elevations; there are, however, no tubercles, teeth, or projecting edges. Propodeum short; with a shallow median concavity; its sides broadly rounded; without raised ridges or projecting lateral angles.

Legs normal; the hind coxæ with a sharp tooth on their upper face; the claws deeply bifid before their apex. Wing venation (Fig. 120) of the ordinary *Odynerus* type.

Abdomen rather short and heavy; its first tergite elongate, convexly rounded towards its base; its terminal part with a faint median depressed line. Second segment broad, wider than long; its tergite normal; its sternite very strongly depressed on its middle towards its base; the sides of this depression broadly rounded, not at all carinate.

Punctation moderately strong; very scattered and superficial on the mesonotum, much coarser and denser on the pronotum, mesopleura, and dorsal areas of the propodeum. The punctures are very scarce, hardly visible on the clypeus, the major part of the head, the tegulæ, and the abdomen. These parts may be called impunctate; however, they are not smooth, but dull, the integument being microscopically shagreened and covered with a bloom.

Dark ferruginous-red, with indefinite black spots on front, vertex, upper side of the flagellum, apex and inner margin of the mandibles, and base of first and second abdominal segments. Mesonotum nearly entirely black. The following markings are whitish-yellow: a narrow stripe along the posterior margin of the pronotum; the outer margins of the tegulæ; a narrow, transverse, median band on the postscutellum; the apical margins of tergites 1 to 3 and of the second sternite; these margins are widened on the sides of the tergites 1 and 2 and incompletely connected with a lateral spot of the same color on each side of these segments. Wings, for the larger part, with a bright yellowish tinge; more smoky and purplish towards the apex.

Length (h. + th. + t. 1 + 2), 12 mm.

♂.— Very similar to the female. The clypeus (Fig. 121) is much broader than long, broadly and deeply, semicircularly emarginate at its apex, nearly flat. Vertex without fovea. The antennæ are elongate (Fig. 119); all the joints of their flagellum being distinctly longer than broad; their terminal joints show a tendency to curl up, but they cannot be described as forming a regular spiral as in *Odynerus, sensu stricto.* Their terminal hook-like joint is very long, strongly curved, narrow, digitiform, terminating in a rather sharp apex which reaches the base of the tenth joint; none of the preceding joints are flattened or grooved at the under side. Legs normal, as in the female. Clypeus impunctate; dull; without pubescence.

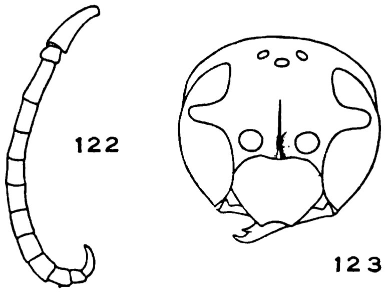
The ferruginous and black colors have about the same distribution as in the female, but the yellow markings are different; the yellow covers the whole of the clypeus, a broad transverse spot on the front, a narrow apical band on tergite 1, and two transverse apical spots on tergite 2. In one of the specimens there is a minute, lateral spot on the anterior part of tergite 2, which is absent in the other male. No yellow markings on the thorax.

Length (h. + th. + t. 1 + 2), 10 to 12 mm.

Belgian Congo.— 1 ♀ and 1 ♂ from Matadi, June 1915, and 1 ♂ from Boma, June 1915 (J. Bequaert Coll.).

40. **Odynerus (Rygchium) picturatus,** new species

♂.— Head: Fig. 123. Clypeus very broad, nearly one and one-half times as broad as long; very moderately swollen, rather flattened in its inferior part; its apex wide, nearly one-third of the total width of the clypeus, truncate, very feebly emarginate, with bluntly rounded angles. Front flattened; with a short raised carina above the clypeus. Vertex very broad and long, without fovea; the posterior ocelli nearly as far from each other as from the inner margin of the eyes, much more remote from the hind margin of the vertex (this last distance about one and one-half times that separating the posterior ocelli from the eyes). Temples very broad and distinctly swollen behind the eyes. Temples and vertex margined behind by a distinctly raised carina. Mandibles as long as the great ocular diameter; their apex narrow and slightly curved; their inner margin with a single distinct tooth before their apex. Antennæ (Fig. 122) elongate; their scape comparatively short; their flagellum rather long, showing a tendency to curl up at its end, all its joints distinctly longer than broad; terminal hook-like joint moderately long, slender, digitiform, strongly curved, tapering to a sharp apex which does not reach over the base of the tenth joint and is apparently never folded against the under side of the flagellum. None of the apical joints of the flagellum show any depression or groove beneath.



Figs. 122–123. *Odynerus picturatus,* new species.
Fig. 122. Antenna, ♂. Fig. 123. Head in front, ♂.

Thorax rather broad, only slightly longer than broad or high. Pronotum broadly truncate anteriorly; with a fine, decolorate, raised margin; its lateral angles rounded, not projecting. Mesonotum without parapsidal grooves; with a minute, depressed line on the middle of its anterior half and on each side above the tegulæ. Scutellum flat; scarcely depressed on its middle line; without lateral tubercles or carinæ. Postscutellum transverse; short; swollen to form a transverse, crenulate ridge, which is slightly depressed into a saddle on its middle line. Propodeum comparatively long; its lateral parts distinctly swollen, reaching each other on the middle line beneath the postscutellum, not forming there, however, a dorsal posterior area, since the posterior half of the postscutellum is part of the concavity of the propodeum. Ridges of the propodeum rounded; without carinæ; its lateral angles, however, forming distinct, but bluntly rounded protuberances. Epicnemia of the front legs bordered behind by a minute, raised, vertical carina of the mesopleura. Legs normal; the hind coxæ with a feeble tooth on their upper face; claws deeply bifid before their apex. Wing venation of the ordinary *Odynerus* type.

Abdomen short and heavily built; its first tergite large, broadly rounded towards its base. Second segment much broader than long; its sternite moderately, although distinctly, depressed or flattened towards its base, scarcely forming a saddle; apical margin of tergites 2 and 3 narrowly decolorate, lamelliform; the apical lamella of the second tergite slightly raised.

Punctation coarsely rugose on head and thorax, including the dorsal areas of the propodeum; the lateral areas of the propodeum minutely striate. Clypeus and front nearly impunctate, dull. Tegulæ very minutely, microscopically punctate. Abdomen apparently impunctate; its second segment with a few, scattered punctures on its sides and near the posterior margin of its tergite; its sternite distinctly punctate.

Black, with abundant yellow markings as follows: the clypeus entirely; the outer face of the mandibles; a very broad triangle with rounded edges on the front; a narrow stripe in the emargination of the eyes continuing below towards the clypeus; a very large spot on the upper two-thirds of the temples; the under side of the antennal scape; the major part of pronotum, scutellum, postscutellum, and propodeum; a spot on the episterna of the mesopleura; large lateral spots on the tergites 1 and 2 and on sternite 2; apical bands on tergites 2, 3, and 4; the outer side of all the tibiæ and of the front femora; and spots near the apex of the middle femora and on the outer side of the middle and hind coxæ. The antennæ (except for a blackish tint on the upper side of the middle joints of their flagellum), a spot in the inferior part of the temples, the apical part of the mandibles, the humeral calli of the pronotum, tegulæ, posttegulæ, a vertical stripe on the mesopleura, the sides of the propodeum, the metapleura, the legs (except for their yellow markings and the black trochanters), the sides and base of tergite 1, the whole of sternite 1, the basal half of sternite 2, and nearly the whole of the segments 5 to 6, ferruginous-red. Wings hyaline, with yellowish costal and median cells and stigma; the radial cell with a dark, purplish spot.

In the other male specimen there are no yellow spots on the mesopleura and on the sides of the second sternite; and the fourth tergite has no apical yellow band.

Length (h. + th. + t. 1 + 2), 9.5 mm.

♀ unknown.

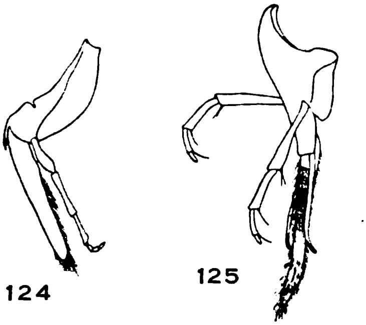
Belgian Congo.— Description based on 2 males from Thysville, June 1915 (J. Bequaert Coll.).

This wasp is closely related to the male of the species described in this paper as *O. angolensis* Radoszkowsky, both having similarly built antennæ. However, the difference in the shape of the clypeus, besides the punctation of the mesonotum, separates them at once.

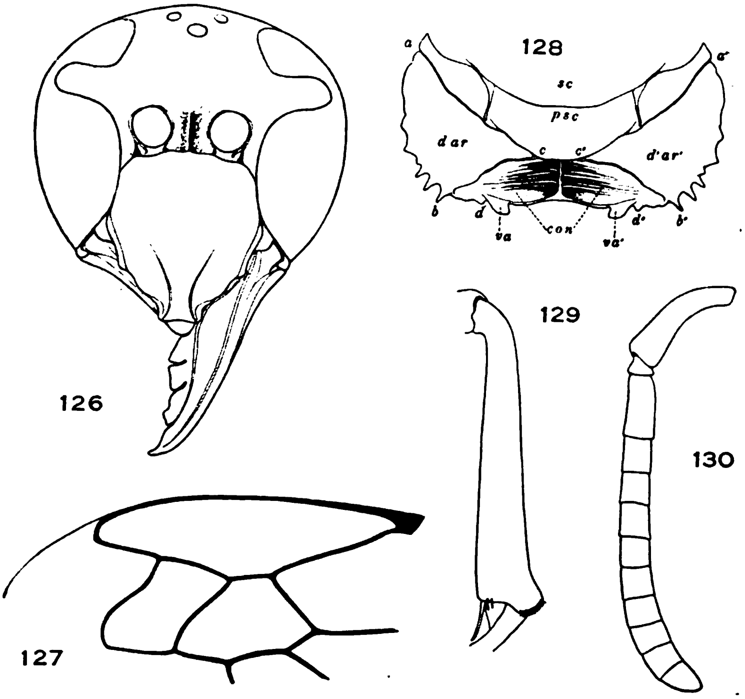
41. **Odynerus (Rygchium) æstuans** (Saussure)

Rhynchium æstuans H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 206; *nec Odynerus æstuans* H. de Saussure, idem., p. 222.

Although this species apparently has a wide distribution, being known



Figs. 124–125. Mouth parts of *Odynerus æstuans* (Saussure), ♀.
Fig. 124. Maxilla and maxillary palpus. Fig. 125. Labium and labial palpi.



Figs. 126–130. *Odynerus æstuans* (Saussure).

Fig. 126. Head in front, ♀. Fig. 127. Venation of front wing, ♀. Fig. 128. Propodeum and postscutellum from above, ♀: *sc*, scutellum; *psc*, postscutellum; the sclerite behind the line *acc'a'* is the propodeum; *con*, concavity; *dar* and *d'ar'*, dorsal lateral areas or dorsal areas; *va* and *va'*, scales of the valvula protecting the articulating muscle of the abdomen; *ab* and *a'b'*, lateral ridges; *cb* and *c'b'*, superior ridges; *bd* and *b'd'*, inferior ridges; *b* and *b'*, lateral angles of propodeum. Fig. 129. Hind tibia, ♀. Fig. 130. Antenna, ♀.

from Senegal, Cameroon, the Belgian Congo, and Natal, very little has been published to show its true specific characters.

It is a large-sized wasp, very similar to *Synagris æstuans* (Fabricius) not only in its coloration but also in its facies. More than any other *Odynerus*, it resembles a *Synagris*. However, it can be distinguished at once from *S. æstuans* (Fabricius) by its unarmed postscutellum, the absence of strong tooth-like lateral angles on the propodeum, and the differently shaped clypeus, besides the generic differences in the labial and maxillary palpi.

♀.— Head subcircular (Fig. 126). Clypeus only slightly longer than broad; moderately convex; its inferior lateral margins, between the base of the mandibles and its apex, strongly sinuate; the basal half of this lateral margin is flattened and somewhat curved upward. The apex of the clypeus forms a distinctly projecting, median piece, which has broadly rounded lateral angles and is very faintly emarginate in the middle of its anterior margin; this apical median piece is comparatively narrow, being less than one-third as wide as the clypeus. An inconspicuous, longitudinal carina runs on each side of the middle line in the apical third of the clypeus. Mandibles long and broad; with strong ridges on their outer side; their apical inner margin with three broad, flattened teeth in front of their recurved apex. Labial palpi (Fig. 125) distinctly 4-jointed; maxillary palpi (Fig. 124) 6-jointed, their three terminal joints much smaller than their three basal ones, subequal, together about as long as their third joint. Vertex normally developed, with a broad and deep hairy fovea; the posterior ocelli slightly closer to each other than to the inner margin of the eyes. Front, between the insertion of the antennæ, with a very sharp, conspicuous median carina, which, however, is short and does not continue into a ridge above the antennal pits. Antennæ (Fig. 130) comparatively short, their flagellum feebly swollen towards its apical half; their third joint about as long as their fourth and fifth together.

Pronotum with broadly rounded edges and a sharp anterior margin. Mesonotum without carinæ or parapsidal furrows. Scutellum flat. Postscutellum without teeth, lamellæ, or protuberances; feebly transversely swollen between its anterior horizontal face and its posterior vertical portion. Mesopleura with a sharp carina bordering the epicnemia of the front legs in their inferior part. Propodeum (Fig. 128) as seen from above, comparatively short; broadly interrupted on its middle line by the postscutellum; with sharply marked lateral, superior, and inferior ridges and projecting, lateral angles; its lateral ridge with a series of sharp, irregular teeth. Dorsal areas of the propodeum densely and very coarsely, rugosely reticulate; their lateral areas only feebly sculptured, without striation. Concavity of the propodeum distinct, but not very pronounced; its surface impunctate, shining, with moderately strong, transverse striæ.

Legs long and heavily built. Middle tibiæ with a single apical spur. Femora normal; hind coxæ without a prominent tooth or ridge on their upper face. Posterior tibiæ (Fig. 129) strongly broadened at their apex, which presents at its upper external end a compact row of 12 to 15 stout and short spines; their outer side is rather abundantly hairy so that the short spines, which are scattered along the external border, are difficult to see. Wing venation: Fig. 127. The second cubital cell large.

Abdomen rather elongate. Its first segment convexly rounded at its base, distinctly narrower than the second, only slightly broader than long; the second segment about as long as broad. Second sternite with a distinct, but shallow, median depression margined by convexly rounded, elongate ridges and occupying the larger part of the sternite.

Punctation of head and thorax medium-sized and very dense; that of the clypeus much coarser, somewhat obliquely rugose; the punctures on the back of the abdominal tergites of about the same size as on the thorax, but much more remote; much stronger on the sternites. The dorsal face of the abdomen is dull, being densely clothed with a black bloom; the ventral face smooth and shining.

The coloration of the four specimens before me is very similar. Mostly black; with the antennæ, clypeus, larger part of the mandibles, legs, larger part of pronotum, tegulæ, mesopleura, sternum, propodeum, and base and sides of first tergite bright ferruginous-red. Rounded ivory-white spots as follows: one on the front, at the upper end of its median carina; one on each side of the pronotum; one on the tegulæ; a transverse one on the postscutellum; and a pair on the first and second tergite. The pair of the first tergite is rather close together, the spots being as far from the lateral margins of the tergite as from each other and distinctly removed from its apical margin; the spots of the second tergite are very close to the apical margin and larger than on the first tergite. Wings uniformly infuscated, with a yellowish-golden tinge.

Length (h. + th. + t. 1 + 2), 16 to 18 mm.

The ♂ has apparently not been described.

Belgian Congo.— Stanleyville, 2 ♀♀, April 1915; Niangara, 1 ♀, November 1910; Medje, 1 ♀, July 1910 (Lang and Chapin Coll.).

42. **Odynerus (Rygchium) osborni,** new species

Plate I, Figure 4

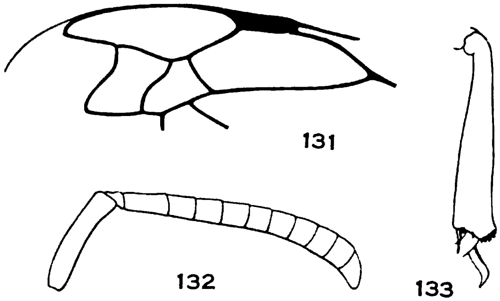
♀.— Head subcircular. Clypeus slightly longer than broad; moderately convex; shaped almost exactly as in *O. æstuans* (Saussure), (= *Rygchium æstuans* Saussure), especially with regard to its apex, terminal side-margins, and sculpture. Mandibles as in *O. æstuans* (Saussure); with three broad, flattened teeth before their apex. Labial and maxillary palpi also as in that species. Vertex with a small hairy fovea; the posterior ocelli as far from each other as from the inner margin of the eyes. Front with a sharp carina between the insertion of the antennæ. Antennæ (Fig. 132) slightly shorter than in *O. æstuans;* their flagellum somewhat more swollen; their third joint distinctly shorter than the two following together.

Thorax almost exactly as in *O. æstuans*. The propodeum also similarly shaped; its dorsal areas more finely rugulose; its superior ridges very strong, raised so as to form lamellæ; the teeth less distinct along its lateral ridges, but stronger along its inferior ridges; the transverse striæ of its concavity much stronger. The lateral areas of the propodeum are distinctly sculptured, presenting a fine transverse striation. Transverse ridge of the postscutellum much more distinct than in *O. æstuans*.

Legs comparatively short. Middle tibiæ with a single apical spur. Femora normal. Hind coxæ without tooth or ridge on their upper face. The posterior tibiæ (Fig. 133) are moderately broadened at their apex, which presents on its upper external end a rather loose comb of 9 slender spines; their outer side is only slightly pilose, so that the few, short spines along the external border are very apparent. Wing venation: Fig. 131. The second cubital cell comparatively small.

Abdomen rather short and compact. First segment much broader than long, only slightly narrower than the second segment, which is about twice as broad as long. Second sternite only slightly flattened on its middle; without depression.

Punctation as in *O. æstuans*, but denser on the dorsal face of the abdomen, which has no black bloom; the punctures, therefore, more apparent.



Figs. 131–133. *Odynerus osborni*, new species.
Fig. 131. Venation of front wing, ♀. Fig. 132. Antenna, ♀. Fig. 133. Hind tibia, ♀.

Coloration very striking. Mostly black; scape, under side of flagellum, clypeus, apex of mandibles, pronotum almost entirely, tegulæ, mesopleura for the most part, and legs, ferruginous-red. A small whitish dot on the front at the upper end of the interantennal carina and on the posttegulæ. Dorsal areas of propodeum and sides of the five anterior abdominal tergites, each with an almost circular, ivory-white spot; these spots are situated far from the apical margins and form a lateral, very regular row; they are the largest on the sides of the second tergite and become smaller behind. Wings uniformly infuscated, with a purplish effulgence.

Length (h. + th. + t. 1 + 2), 13 mm.

♂ unknown.

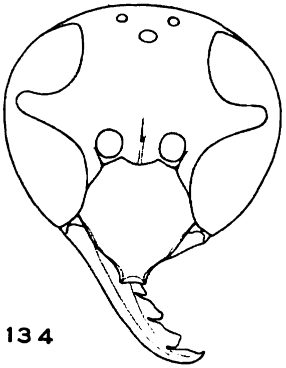
Belgian Congo.— Walikale, 1 ♀, January 1915 (J. Bequaert Coll.).

This species is closely related to *O. æstuans* (Saussure) but, I believe, quite distinct. The absence of a median depression on the second sternite, the different sculpture of the propodeum, and the different armature of the apex of the hind tibiæ (in addition to the striking coloration, which may, however, be variable) are sufficient to separate it.

43. **Odynerus (Rygchium) marginellus** (Fabricius)

This species is perhaps the most common wasp of equatorial Africa; the markings of the body are very striking, at least in its typical form; but they are misleading, for several other species exhibit exactly the same coloration. Such species are *Odynerus lateralis* Fabricius (= *Rygchium furax* Kohl); *O. pseudolateralis* Meade Waldo; *O. gestroi* (Magretti), of which *Odynerus spiniger* A. v. Schulthess is probably a synonym; and others. It therefore seems worth while to record its most important structural characters.

♀.—Head: Fig. 134. Clypeus distinctly longer than broad; piriform; distinctly swollen; strongly narrowed towards its anterior margin, which has about one-quarter of the total width of the clypeus and is straight or very slightly incurved; it seems, however, to be deeply emarginate, owing to the presence of two strong lateral carinæ, which run obliquely in the inferior part of the clypeus from near its median line towards the prominent lateral angles of its anterior margin. Surface of the clypeus with a few scattered, strong punctures, but not rugose as a whole. Vertex with a crescent-shaped, median, groove-like, hairy depression near its posterior margin. The maxillary palpi much as in *O. æstuans* (Saussure). Mandibles slightly longer than the great ocular diameter. Antennæ scarcely swollen towards their apex; their third joint about three times as long as the second; the following joints as long as, or slightly longer than, broad.



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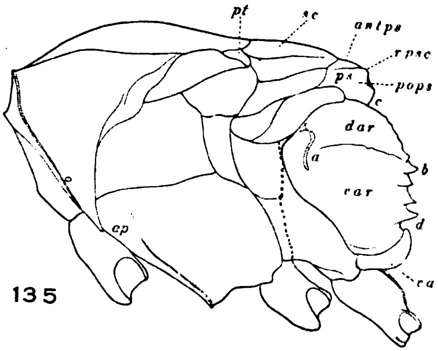

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Figs. 134–135. *Odynerus marginellus* (Fabricius).

Fig. 134. Head in front, ♀. Fig. 135. Thorax in profile, ♀: *sc*, scutellum; *ps*, postscutellum; *antps*, its anterior or horizontal face; *pops*, its posterior or vertical face; *rpsc*, its transverse ridge; *ab*, lateral ridge of propodeum; *bc*, its superior ridge; *bd*, its inferior ridge; *va*, valvula protecting the articulating muscle of the abdomen; *dar*, dorsal lateral area or dorsal area of propodeum; *var*, ventral lateral area or ventral area of propodeum; *pt*, posttegula; *ep*, epicnemium (prepectus or epicnemial area).

Thorax (Fig. 135) densely covered with medium-sized punctures, except on the posterior half of the mesonotum, the scutellum, and the tegulæ, which are smooth and shining, with a few remote, very superficial punctures towards their sides. Mesonotum without parapsidal furrows, but with a fine depressed longitudinal line on each side above the tegulæ. Scutellum abruptly oblique on its sides near the wings. Postscutellum with its anterior half depressed, slightly oblique, short, terminating on each side in a blunt tubercle, broadly rounded towards its vertical posterior portion, without rough sculpture or denticulations. Mesopleura with a strong and sharp carina in front, bordering the epicnemia of the anterior legs. This carina begins on the lower half of the pleura near the termination of the episternal suture and runs somewhat sinuately towards the mesosternum, where it continues to near the median ventral line as a very strong, transverse ridge in front of the insertion of the legs. Concavity of the propodeum strongly, transversely striate; its superior ridge rounded; the striation continuing in the dorsal areas, which are very rugose. The lateral and inferior ridges of the propodeum sharp, with a number of sharp teeth; its ventral lateral areas not striate, with remote, heavy punctures.

Abdomen uniformly and strongly punctured all over, more densely so towards the hind margin of the second and following tergites; very shining between the punctures. Second abdominal sternite uniformly flattened, slightly convex; rounded at its base towards a short, abruptly vertical face; without any tubercles or excavation.

Length (h. + th. + t. 1 + 2), 12.5 to 15 mm.

♂.— Very similar to the female. Clypeus more pentagonal; its apex slightly emarginate and with sharp lateral angles, but without prominent longitudinal carinæ; its surface very minutely punctate. Vertex without hairy fovea. Last joint of the antennæ short and thick, gradually tapering from its base to its very blunt apex, scarcely curved, reaching the base of the eleventh joint. Femora of the middle legs distinctly swollen in their apical half, slightly depressed on the inner side in their basal half, but without saddle-shaped excavation.

Length (h. + th. + t. 1 + 2), 9 to 14 mm.

The coloration of the typical form is very striking and nearly the same in both sexes: Head and thorax are, for the most part, ferruginous-red, sometimes nearly completely so; as a rule, however, the front and vertex, the sutures of the thorax, the mesonotum, and the scutellum are partly or completely black; legs ferruginous-red. Abdomen black; ferruginous at its base and often more or less so on its ventral side and at its anal segment; with a broad, continuous, bright yellow lateral band running from the middle of the first tergite to the anal segment, the yellow color reaching the hind margin of the first tergite. In the male, the clypeus, a frontal spot between the antennæ, and the inferior margin of the emargination of the eyes are also yellow, although the sides of the clypeus retain sometimes the ferruginous color. The wings are dark purplish-brown in their apical half, hyaline with a slight yellow tinge in their basal half.

Belgian Congo.— One of the common species. I have seen numerous specimens from Banana, Malela, Boma, Thysville, Stanleyville, Garamba, and Faradje.

This species has a wide range on the African continent, being recorded from Mauritania and Somaliland to the Transvaal.

In the Congo Expedition collection there is a single male from Boma which presents all the structural characters of *O. marginellus*, but in which the yellow markings are nearly completely gone. The abdomen has no lateral fasciæ, but one sees a few punctiform yellow spots on the sides of the different tergites, these markings being much larger on the two apical segments; on the head, the yellow is restricted to two longitudinal stripes on the clypeus. There can, however, be no doubt that this is an aberrant specimen of *O. marginellus* (Fabricius).

O. marginellus (Fabricius) is the most common representative in Central Africa of a group of medium-sized, variously colored species of *Odynerus* with a smooth, shining scutellum and posterior half of the mesonotum; in their other structural characters, these wasps all agree fairly well with the description given above for *O. marginellus*. This group includes numerous forms distributed from Southern Europe throughout the African Continent and the Indo-oriental region as far as Formosa and Australia. The first described form is *O. hæmorrhoidalis* (Fabricius), and the following forms, which I believe to belong in this group, are hardly more than color variations of *O. hæmorrhoidalis*.

1. *O. hæmorrhoidalis* (Fabricius) and its numerous color varieties: *quinquecinctus* (Fabricius), *ater* (Saussure), *carnaticus* (Fabricius), *medius* (Maindron), *künckeli* (Maindron), *parentissimus* (Saussure), *rubropictus* (Saussure), *sanguineus* (Saussure), *dohertyi* (Schulz), *salomonis* (G. Meade Waldo), and others. Distributed from Southern Arabia, throughout the Indo-oriental region, to Australia and the Solomon Islands.[1]

2. *O. oculatus* (Fabricius) is the common form of Southern Europe, Egypt, and Southern Arabia, with the var. *lefebvrei* (Lepeletier). Magretti described a var. *somalicus* from Abyssinia.

3. *O. marginellus* (Fabricius). See the description given above.

4. *O. cyanopterus* (Saussure), with its varieties *sabulosus* (Saussure) and *congicus* J. Bequaert, has nearly the same distribution as *O. marginellus* (Fabricius) and is found also in Southern Arabia (p. 146).

5. *O. multispinosus* (Saussure). Natal.

6. *O. xanthurus* (Saussure). Cape Colony.

7. *O. mirabilis* (Saussure) and its color forms: *O. superbus* (Saussure), *O. decoratus* (Saussure), and *O. rothi* (W. Kirby). Malay Archipelago, New Guinea, Australia, Tasmania.[2]

Ethology. Notwithstanding the abundance of *O. marginellus*, E. Roubaud[3] is the only observer who has paid any attention to its life history. According to his observations, which were made in the Dahomey, this species shows a marked preference for native huts. It burrows galleries indifferently in the wood of the poles which support the roof or in the mud of the walls; the entrance to the nest is free and each gallery contains two or three cells in succession, separated by mud partitions. If a female burrows several galleries, they are not connected with each other. The egg is fixed by a thread in the bottom of the cell; then the prey, consisting of paralyzed caterpillars, is hastily brought in, the entrance to the cell being closed before the egg hatches.

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[1] W. A. Schulz, Berlin. ent. Zeitschr., XLIX, 1905, pp. 220–223.

[2] W. A. Schulz, Berlin. ent. Zeitschr., XLIX, 1905, pp. 218–220.

[3] Ann. Sc. nat. Zool., (10), I, fasc. 1, 1916, pp. 32–35 (*Rhynchium marginellum*).

Odynerus (Rygchium) cyanopterus (Saussure)

The structural characters of this species are much the same as those of *O. marginellus* (Fabricius). Its most striking peculiarity is the presence of an abundant, short pubescence, which is deep black or brownish-gray on vertex, pronotum, and mesonotum; grayish or silvery-white and somewhat pruinose on the rest of the body. This silky bloom is especially noticeable on the abdomen and is in strong contrast with the nearly naked body of *O. marginellus.*

O. cyanopterus never possesses lateral yellow bands on the abdomen; but the clypeus and front of the male have yellow markings similar to those of *O. marginellus* (Fabricius), whereas the wings are also colored as in that species.

The following variations of the color of the body are noteworthy:

1. Typical *O. cyanopterus* (Saussure).— Body almost equally black and ferruginous-red; the latter color extending over the head, thorax, legs, and first abdominal segment, sometimes also over the second segment. I have not yet seen this typical form, which seems to occur chiefly in the Sudan, Northeastern Africa, and Southern Arabia.
2. var. *sabulosus* (Saussure).— The ferruginous-red color much less extended, the black covering the whole of the abdomen, the front, and the larger part of the mesothorax (the mesonotum and scutellum almost entirely black). The anal segment partly ferruginous. This seems to be the common South African form; I have seen females and males from Lourenzo Marques (Cornell University Coll.). The var. *mossambicus* Gribodo and *Rhynchium transvaalense* P. Cameron are, in my opinion, not different from this var. *sabulosus.*
3. var. *congicus*, new variety.

44. **Odynerus cyanopterus** var. **congicus**, new variety

♀.— Body almost entirely black. Only the following parts are more or less ferruginous-brown: the apical portion and sometimes also the sides of the clypeus; the mandibles; the emargination of the eyes; a line on the posterior orbits; the under side of the antennæ; the tegulæ; the apex of the front femora; the tibiæ and tarsi of the front legs; and the end joint, with the claws, of all the legs. The wings are as in the typical form: hyaline at their base, dark brown with purple effulgence on their apical two-thirds.

Length (h. + th. + t. 1 + 2), 12.5 to 15 mm.

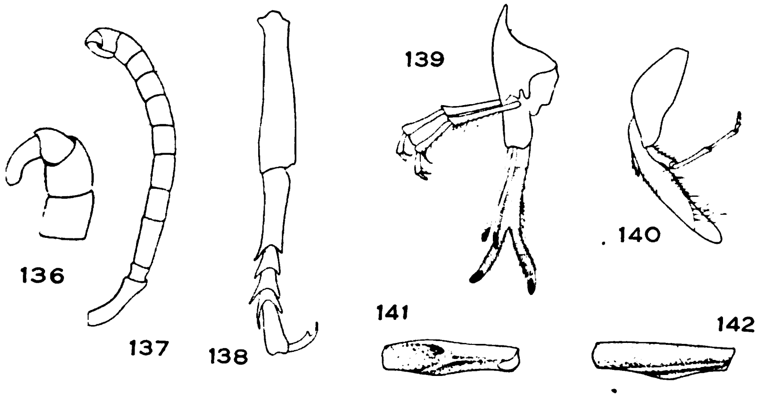
Belgian Congo.— Avakubi, 1 ♀, holotype; Stanleyville, 5 ♀ ♀, paratypes (Lang and Chapin Coll.).

This seems to be the only form of the species hitherto recorded from the Congo.

45. **Odynerus (Rygchium) synagroides** (Saussure)

(= *Synagris odontophora* Schletterer; *Rygchium synagroides* Saussure)

A. Schletterer[1] described from the Belgian Congo a *Synagris odontophora*, which Kohl later on transferred to the genus *Rygchium*.[2] There are in the collection of the Congo Expedition numerous specimens of a wasp agreeing in all details with Schletterer's excellent description. This insect belongs with the *Synagris*-like species of *Odynerus* and, since Schletterer includes it in *Synagris*, he compares it with other species of that genus. However, among *Odynerus* too, there are several forms closely related to it;



Figs. 136–142. *Odynerus synagroides* (Saussure).

Fig. 136. Terminal joints of antenna, ♂. Fig. 137. Antenna, ♂. Fig. 138. Front tarsus, ♀. Fig. 139. Labium and labial palpi, ♀. Fig. 140. Maxilla and maxillary palpus, ♀. Fig. 141. Middle femur, ♂, from beneath. Fig. 142. Middle femur, ♂, in front.

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[1] Ann. Soc. ent. Belgique, XXXV, 1891, p. 21.

[2] Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 259.

and, since the species is apparently very common, one might expect to find that it was known long ago under another name. After a careful examination of the subject I came to the conclusion that *Synagris odontophora* Schletterer is identical with *Rygchium synagroides* Saussure (= *sichelii* Saussure).[1]

The following description is made on specimens from the Belgian Congo:

♀.— Clypeus piriform; scarcely longer than broad; convexly swollen; strongly tapering towards its apical margin, which is very narrow, distinctly emarginate, and presents on each side a strongly carinate, prominent angle; its surface slightly rugose by the presence of numerous, scattered, strong and oblique punctures. Vertex with a small, median, hairy depression. The head very long behind the eyes; the distance between the lateral ocelli and hind margin of the vertex being about three times that separating the ocelli from the eyes; the lateral ocelli about as far from each other as from the eyes. The three terminal joints of the maxillary palpi very short and subequal (Fig. 140); the labial palpi (Fig. 139) distinctly 4-jointed. Mandibles about as long as the great ocular diameter, or even longer; their inner margin with three deep but narrow notches, forming broad, blunt teeth. Flagellum of the antennæ scarcely swollen towards its apex; the third antennal joint about four times as long as the second; the following joint distinctly longer than broad.

Thorax densely, uniformly, very rugosely punctate all over, nearly reticulate. Mesonotum without longitudinal carinæ; with a short, fine, depressed, median line in its anterior half and another very short one on each side, above the tegulæ; no parapsidal furrows. Scutellum moderately convex; strongly and rugosely punctate, with a more or less distinct, median, fine furrow, which becomes somewhat carina-like in its anterior half; this furrow sometimes obsolete. Postscutellum without sharp teeth or carinæ; very rugosely reticulate, which gives to the rounded ridge between its horizontal and vertical portion a crenulate appearance; this ridge often depressed on its middle, producing two transverse elevations. Propodeum with rounded superior ridges; its lateral and inferior ridges sharp and crenulate; its lateral angles with two or three prominent, often digitiform, teeth; ventral lateral areas finely punctate with a few scattered stronger punctures; dorsal lateral areas rugosely punctate, somewhat reticulate. Concavity of the propodeum finely and densely, transversely striate. The mesopleura with a strong carina in front bordering the epicnemia of the anterior legs, much as in *O. marginellus;* this carina forming on the mesosternum a feeble ridge in front of the insertion of the middle legs.

Anterior tarsi (Fig. 138) slender; hind tibiæ with numerous minute spines along their upper margin, their external apex with a loose comb of 6 to 12 spines.

Abdomen covered with medium-sized punctures, which become stronger and denser towards the hind margin of the tergites; its integument dull on the back, scarcely shining on the ventral side. Second sternite convexly rounded towards its base in profile; flattened or slightly depressed on its middle; without lateral tubercles or median saddle-like groove.

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[1] To prevent confusion, it may be well to point out that the insect described here as *Odynerus synagroides* (Saussure) is *Rygchium synagroides* Saussure (= *sichelii* Saussure), whereas H. de Saussure's *Odynerus synagroides* must be known as *Odynerus ventralis* Saussure (p. 150; compare also the bibliographic list of the species in the second part of this paper).

Black; clypeus partly or entirely, front, cheeks, mandibles, antennæ, legs, and sometimes also the sides of the first tergite, more or less tinged with ferruginous; the three apical abdominal segments bright chrome-orange; the base of the fourth segment black, especially on its ventral side. Wings uniformly black-brown, with strong purple effulgence. The body with a black, very short and appressed pubescence except on the terminal, orange-colored segments, which are densely clothed with short, appressed, bright golden-yellow hairs. This coloration seems to be very constant, although it is found in several other species of *Odynerus* and *Synagris* (see the list of group II, p. 125).

Length (h. + th. + t. 1 + 2), 15 to 19 mm.

♂.— Clypeus shorter than in the female; subcircular; with scattered fine punctures, and, between these, very minutely rugose; its apical margin broader than in the female, deeply, semicircularly emarginate, with projecting, lateral, tooth-like angles but without carinæ. Vertex without hairy fovea. Last joint of the antennæ (Figs. 136 and 137) short and thick; cylindrical; nearly equally broad over its whole length; slightly curved on its middle; not tapering towards its apex, which is broadly rounded and depasses distinctly the apex of the eleventh joint. None of the terminal joints of the antennæ excavated beneath. Mandibles with a very deep, subcircular emargination about the middle of their inner margin. Femora of the middle legs (Figs. 141 and 142) scarcely swollen, with somewhat angulate sides, flattened or very obsoletely depressed in their basal third on the inner side.

Coloration as in the female; the four apical segments of the abdomen chrome-orange.

Length (h. + th. + t. 1 + 2), 9 to 15 mm.

Belgian Congo.— One of the most common wasps of that region; the collection includes numerous females and males from Banana, Malela, Boma, Coquilhatville, Basoko, Stanleyville, Bafwasende, Bafwaboli, Gamangui, Avakubi, Medje, Poko, Garamba, Faradje, Vankerckhovenville, Yakuluku, Lubutu, Walikale, and Kasindi.

Drawings of the head, as seen in front, of the female and the male of *O. synagroides* (Saussure) may be found in Schletterer's paper.[1] They show the characteristic shape of clypeus and mandibles. They leave no doubt that the Congo specimens described above belong to Schletterer's "*Synagris odontophora.*" H. de Saussure has also figured the clypeus of female and male of his *Rygchium synagroides*.[2] Both of these authors evidently describe the same wasp, since no related species of *Odynerus* or *Synagris* has a similarly shaped clypeus.

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[1] Ann. Soc. entom. Belgique, XXXV, 1891, Pl. I, figs. 1 and 2.

[2] In Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, Pl. IV, figs. 13 and 14.

46. **Odynerus (Rygchium) ventralis** Saussure

(= *Odynerus synagroides* H. de Saussure)

This species must not be confused with several other species of *Odynerus* having a similar coloration of the body, such as *O. synagroides* (Saussure), *O. ardens* Guérin, and, above all, *O. anceps* (Gribodo). H. de Saussure[1] has given a detailed description of it, together with excellent drawings. About the same time, A. Schletterer studied specimens of a wasp, from the Belgian Congo, which he described very completely as *Synagris tropidia* Schletterer.[2] However, in comparing the descriptions and figures of Saussure's *O. ardens* and Schletterer's *S. tropidia*,[3] I became convinced that they refer both to the same species.

♀.— Clypeus about as broad as long, or slightly broader; piriform; distinctly swollen on its upper part; flattened towards its anterior margin, which is very wide, having about one-third of the total width of the clypeus, and broadly truncate; its lateral angles projecting and somewhat raised, though not carinate. Surface of the clypeus with scattered, medium-sized punctures, which become much stronger on its flattened anterior part so as to give it a rugosely striate appearance; its anterior margin broadly smooth, lamelliform. Vertex (Fig. 151) without hairy fovea, very strongly developed and swollen, as are also the temples behind the eyes. Posterior ocelli about as far from each other as from the inner margins of the eyes, nearly four times as far from the hind margin of the vertex. Vertex feebly margined behind; the strongly raised carina which borders the temples becoming obsolete on the upper part of the head. Maxillary palpi (Fig. 144) with their basal joint broad and long; the next two joints shorter and about of equal length; the three following much shorter, subequal; the fourth and fifth together nearly as long as the third. Labial palpi (Fig. 145) four-jointed; their three basal joints thick; the fourth small and slender. Mandibles about as long as the great ocular diameter; with a terminal, curved, strong apex and three other blunt teeth on their inner margin. Antennæ (Fig. 153) scarcely swollen towards their apex; their scape relatively long; their third joint shorter than the fourth and fifth together; joints four, five, six, and seven slightly longer than broad. Head and thorax very strongly and densely punctate, nearly rugosely reticulate.

Thorax heavily built, scarcely longer than broad. Anterior margin of the pronotum with a sharp carina, which is sublamelliform towards its sides; these forming bluntly rounded, projecting, lateral angles. Anterior face of the pronotum smooth and shining. Mesopleura with a truncate carina in front, bordering the epicnemia of the anterior legs, and continuing as a sharp ridge towards the middle of the mesosternum. Mesonotum with three short and feeble, longitudinal grooves; a median

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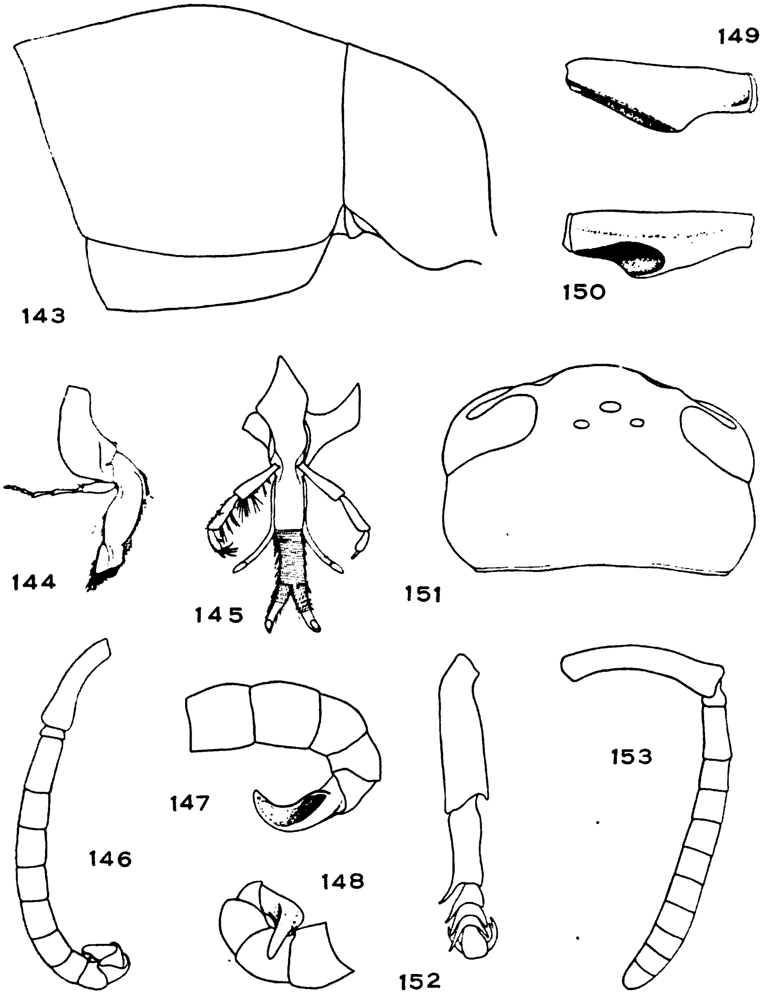
[1] In Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 161, Pl. IV, fig. 17; Pl. XVII, figs. 9 and 9c.

[2] Ann. Soc. ent. Belgique, XXXV, 1891, p. 20, Pl. I, figs. 3 and 5.

[3] Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250, found, on examination of the types, that this species is not a *Synagris*; he includes it in *Rygchium*.



Figs. 143–153. *Odynerus ventralis* Saussure.

Fig. 143. Two basal abdominal segments in profile, ♀. Fig. 144. Maxilla and maxillary palpus, ♀. Fig. 145. Labium and labial palpi, ♀. Fig. 146. Antenna, ♂. Fig. 147. Terminal joints of antenna, ♂, from above. Fig. 148. Terminal joints of antenna, ♂, from beneath. Fig. 149. Middle femur, ♂, from behind. Fig. 150. Middle femur, ♂, in front. Fig. 151. Head from above, ♀. Fig. 152. Front tarsus, ♀. Fig. 153. Antenna, ♀.

one on the middle line in its anterior third; and two shorter lateral ones (more obsolete), each of which is situated above one of the tegulæ. The posterior two-thirds of the mesonotum present, furthermore, on its middle three more or less marked, longitudinal ridges; in the most typical individuals, one sees them as figured by A. Schletterer for his *S. tropidia*[1]; the two lateral carinæ, however, are always much more apparent than the median one, and they converge towards the scutellum, becoming more obsolete behind. In some specimens the lateral carinæ continue, still more diverging, into very superficial grooves towards the pronotum. These two lateral ridges occupy the position of the parapsidal furrows of some related species[2] and are apparently homologous with such furrows. The median posterior ridge is evidently the continuation of the anterior median groove of the mesonotum. Scutellum distinctly swollen; pillow-like; with a fine median longitudinal carina, which is somewhat furrowed and disappears in a groove towards the hind margin; this carina is often obsolete. Postscutellum prominent; with a short horizontal and a much longer vertical portion; its transverse ridge raised, with a lateral crenulate tubercle on each side and, on its middle, with a projecting tooth which is the termination of a more or less distinct, longitudinal, median carina. Propodeum with sharp lateral, superior, and inferior ridges; its superior ridge, however, much less apparent than the two others; on and above the moderately prominent lateral angle, there is a series of four or five irregular teeth. Dorsal lateral areas of the propodeum rugosely reticulate, widely separated from each other on the median line by the vertical face of the postscutellum. Ventral lateral areas with scattered, medium-sized punctures. Concavity of the propodeum coarsely and obliquely striate.

Legs short and heavy; their tarsi broad; this is very marked on the anterior tarsi (Fig. 152), where the second, third, and fourth joints are extended at their apex in a spiniform, anterior lobe; tibiæ with a few minute spines on their outer face and a row of six to eight short, heavy, blunt spines on their external apex. Middle tibiæ with a single apical spur.

Abdomen uniformly scattered with remote, medium-sized punctures, which are only slightly denser towards the posterior margin of the tergites. Second abdominal sternite in profile (Fig. 143) strongly swollen and vertically sloping at its base; its middle part with a broad and deep, saddle-like depression; the sides of its tergite slightly depressed; this produces on each side of this tergite an oblique, rather sharp ridge, which ends in a blunt tubercle near its anterior margin and slopes gradually towards its posterior margin.

The head and thorax are nearly bare; with only a very short, grayish pile which becomes longer on the sides of the propodeum. The clypeus is slightly silvery hairy. The abdomen bears only a very short, bloomy pubescence, which gives it a dull appearance; its orange-brown tip has no bright golden covering, a good distinction from *O. synagroides* (Saussure) (= *Synagris odontophora* Schletterer).

Black. The clypeus; the front partly; the temples; the antennæ (darker brown on their upper side); indefinite spots on pronotum, mesopleura, scutellum, and postscutellum (these spots may disappear completely); the tegulæ; and the legs more or less are ferruginous. I have seen one female in which the pleura and propodeum are mostly ferruginous-red, and even the raised carinæ of the mesonotum and the basal

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[1] Ann. Soc. ent. Belgique, XXXV, 1891, Pl. 1, fig. 5.

[2] Very often, in wasps, furrows and carinæ replace each other, the carina becoming grooved on its upper part.

segment of the abdomen are suffused with the same color. The two apical abdominal segments, and sometimes the apical third of the preceding, bright orange-brown. Wings uniformly dark brown, nearly black, with beautiful purple effulgence.

Length (h. + th. + t. 1 + 2), 17 to 20 mm.

♂.— Differs scarcely from the female. Clypeus more subcircular; with very remote, minute punctures and very finely rugulose all over; convex, indistinctly depressed towards its anterior margin. The vertex shorter and less swollen behind the eyes. Antennæ (Fig. 146) longer; the scape relatively shorter; joints three to nine distinctly longer than thick. None of the terminal joints excavated beneath. Apical, hook-like joint (Figs. 147 and 148) very long, gradually tapering from a broad base to its blunt apex, twisted, *i. e.* curved twice: once near its base downwards; then near its apex which is directed upwards and lies on the under face of the flagellum near the apex of the ninth antennal joint. Legs more slender than in the female; the intermediate joints of the anterior tarsi not distinctly more extended anteriorly than behind, at their apex. The middle femora have a very characteristic shape; on their anterior face, the inferior basal half possesses a very strong, saddle-like depression, bordered by a raised ridge which runs from the middle of the femora towards its apex; this ridge forms a broadly rounded, projecting angle about the middle of the inferior margin of the femur, when looked at from behind (Figs. 149 and 150). This peculiar shape of the middle femora was figured and described by F. Kohl for *Synagris tropidia* Schletterer.[1]

Pubescence and coloration scarcely different from that of the female. Clypeus also ferruginous, only feebly more silvery hairy than in the female.

Length (h. + th. + t. 1 + 2), 15 to 18 mm.

Belgian Congo.— Numerous ♀♀ and ♂♂ from the following localities: Boma, Stanleyville, Avakubi, Poko, and Faradje.

Odynerus (*Rygchium*) *forticulus* (Kohl), from Southern Arabia and Egypt, is a related species; however, from the shape of the clypeus, which is yellow in the male, and the form of the terminal joints of the male antennæ, it is undoubtedly distinct. *Odynerus natalensis* Saussure has the same coloration, but no carinæ on the mesonotum. *Odynerus magrettii* Gribodo also has the coloration of *O. ventralis*, but, according to the description, differs in having the clypeus arcuately emarginate at its apex; *O. magrettii* ought to be compared with *O. natalensis* Saussure and *O. forticulus* (Kohl).[2]

The description of the female *Odynerus ventralis* (= *synagroides* Saussure) given by H. de Saussure in Grandidier[3] undoubtedly applies to the wasp described here from the Congo. The same cannot be said of the description of the male, where de Saussure seems to have mixed two different species, as appears from his description of the clypeus. His drawing of the male clypeus (Pl. XVII, fig. 9*c*) certainly does not belong to the male of *O. ventralis* Saussure but agrees much better with that of the male of *O. forticulus*

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[1] Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 251, Pl. v, figs. 22 and 29.

[2] W. A. Schulz, Zoolog. Ann., IV, 1911, p. 199.

[3] Hist. de Madagascar, XX, pt. 1, Hym., 1890, p. 161, Pl. IV, fig. 17.

(Kohl). Good drawings of the head and clypeus in the female, and of the thorax have been published by Schletterer; the clypeus of the male and the middle femur of the same sex have been figured by F. Kohl. I have given a figure of the middle femur of the male in order to allow of a comparison with its shape in *O. anceps* (Gribodo).

Odynerus ventralis Saussure is probably widely distributed throughout the western part of the Ethiopian region, being found from Senegal to the Gaboon and the Upper Nile. It must, however, often have been confused with related species, especially with *O. anceps* (Gribodo). See that species.

47. **Odynerus (Rygchium) anceps** Gribodo

The following description is based on a pair which was taken as adults from a nest found at Lukula (see below). There can, therefore, be no doubt that they belong, as female and male, to the same species, a fact which is important since the female of this species resembles very closely that of *O. ventralis* Saussure.

♀.— Head (Fig. 155) of the general shape of that of *O. ventralis* Saussure; the vertex being also distinctly swollen above the eyes, when seen in front. Clypeus also very similar to that of *ventralis*, with broadly truncate apical margin; in the sculpture there is a slight difference between the two species: the surface is almost uniformly and finely rugose all over, whereas in *O. ventralis* there is a distinct separation into an upper, rather punctate and a lower, very rugose part. Vertex without fovea; the relative distance of the posterior ocelli from each other, from the inner margin of the eyes, and from the hind margin of the vertex, about as in *O. ventralis;* however, the vertex apparently a little shorter (Fig. 158). Palpi and mandibles as in *O. ventralis*. Third joint of the antennæ (Fig. 157) about as long as joints four and five together.

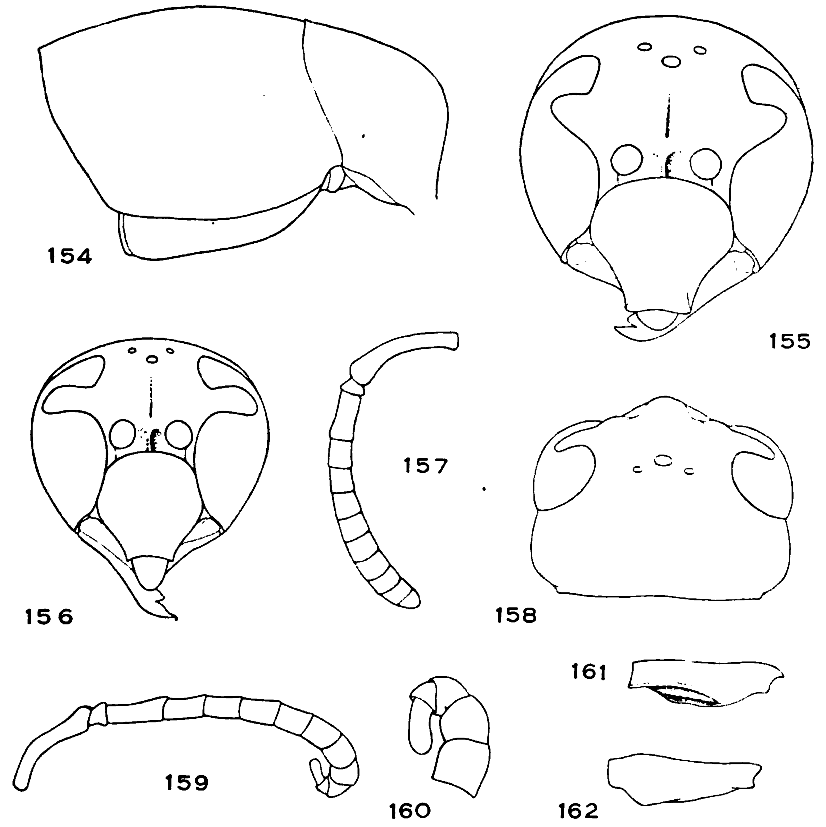
Structure of the thorax very similar to that of *O. ventralis*. The mesonotum presents also, over its posterior two-thirds, two longitudinal raised lines, but they are much less apparent than in *O. ventralis* and never carina-like; the median raised line is only feebly indicated. The scutellum, postscutellum and propodeum are also similar, but the lateral tubercles and median carina of the postscutellum are less distinct than in *O. ventralis* and the reticulation covering the postscutellum is much finer. Legs and wings as in *O. ventralis*.

Abdomen (Fig. 154) as in *O. ventralis*, but the second sternite scarcely depressed on its middle, its lateral ridges low, broadly rounded, not forming tubercles towards their base, but, when seen in profile, very gradually sloping.

Punctation and coloration much as in *O. ventralis*. The orange-brown tip of the abdomen has no bright golden covering of pubescence.

Length (h. + th. + t. 1 + 2), 16 mm.

♂.— Head and clypeus (Fig. 156) very similar to those of the male of *O. ventralis;* the apical margin of the clypeus being also broadly truncate. Terminal hook-like joint of the antennæ (Figs. 159 and 160) of an entirely different shape: it is comparatively short and broad, flattened, scarcely curved, not at all twisted, very broadly rounded at its apex, and almost spatulate; it reaches over the apex of the ninth joint; none of the terminal joints of the antennæ excavated beneath. The second abdominal sternite is more depressed on its middle than in the female, distinctly saddle-like; but its lateral ridges are broadly rounded and gradually sloping towards their base, so that in profile the sternite presents about the same shape as in the female. Shape of the middle femora (Figs. 161 and 162) somewhat similar to that of *O. ventralis*, but the saddle-like depression of their anterior face is more elongate and also more pronounced, being bordered by almost carina-shaped, longitudinal ridges; the projecting rounded angle on their inferior margin is distinctly nearer to the base of the femur (in *O. ventralis* it is placed about the middle).



Figs. 154–162. *Odynerus anceps* (Gribodo).

Fig. 154. Two basal abdominal segments in profile, ♀. Fig. 155. Head in front, ♀. Fig. 156. Head in front, ♂. Fig. 157. Antenna, ♀. Fig. 158. Head from above, ♀. Fig. 159. Antenna, ♂. Fig. 160. Terminal joints of antenna, ♂. Fig. 161. Middle femur in front, ♂. Fig. 162. Middle femur from behind, ♂.

Coloration similar to that of the female. Upper part of the clypeus somewhat tinged with dirty yellow.

Length (h. + th. + t. 1 + 2), 14 mm.

Belgian Congo.— The two specimens described above were obtained at Lukula (J. Bequaert Coll.). Other specimens, which I refer to the same species, were found at Stanleyville, 1 ♀ and 3 ♂♂; Bafwasende, 1 ♀; Avakubi, 1 ♀ and 1 ♂; Medje, 2 ♀ ♀ and 1 ♂; and Poko, 1 ♀ (Lang and Chapin Coll.).

O. anceps (Gribodo) comes very near *O. ventralis* Saussure, looking somewhat like a diminutive form of that species. The males are easily recognized by the shape of the terminal hook of the antennæ and the middle femora. The separation of the females is much more difficult and the only differences which I was able to discover are given above. It is interesting to note that both species inhabit the same area.

The average size of the 13 specimens of *O. anceps* which I have seen is smaller than that of *O. ventralis*, the length (h. + th. + t. 1 + 2) varying in the female between 14 and 17 mm., in the male between 12 and 14 mm.

Gribodo, in describing *O. anceps*, has stated that this species, of which he knew only the female, might be the other sex of *O. ardens* Guérin, which was originally described on the male. H. de Saussure, however, described the female of *O. ardens* as *Rygchium abyssinicum* Saussure. There is much probability indeed that *O. anceps* Gribodo and *O. ardens* Guérin are synonyms, but the question cannot be satisfactorily settled now because the published descriptions of *O. ardens* and *Rygchium abyssinicum* are too fragmentary.

Ethology. E. Roubaud[1] has given a detailed account of the life history of a wasp which he refers to "*Rygchium anceps* Gribodo."

According to this writer the species burrows in vertical clay surfaces, in house walls, old termite nests, etc., or even appropriates empty clay nests of *Synagris;* a peculiarity of this species is that it always builds a long chimney of clay, recurved downwards, at the entrance of its nest; immediately behind the entrance is an initial, subspherical room in which open four to eight nesting galleries, each composed of eight to thirteen cells. The egg is laid freely or suspended by a thread in the bottom of the cell, which is then very quickly filled up with caterpillars. *Mesostenus tripartitus* Brullé was the only parasite obtained from these nests.

I was able to make similar observations on a nest of *O. anceps* found at

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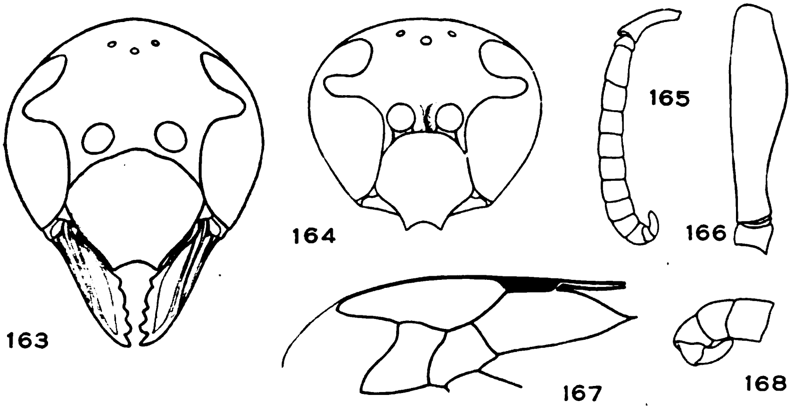
[1] Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 16–20. On p. 18 of Roubaud's paper I am said to have observed in the Lower Congo, *Rygchium abyssinicum* [= *Odynerus ardens* (Guérin)] building a chimney at the entrance of its nest; these observations refer to *O. anceps* (Gribodo) which, as stated above, may, however, prove to be a synonym of *O. ardens* (Guérin).

Lukula, September 1, 1913. This nest was built inside a mushroom-shaped clay termitarium, in the savannah. The entrance of the nest was provided with a chimney of clay, directed downwards, slightly curved at its base, and widened into a funnel at its open end. It was about 4 cm. long and 15 mm. wide at the opening. The base of the chimney led into a small cavity and in different directions from this chamber were found four closed cells: one contained an adult male, the second an adult female, the third a pupa, and the fourth a full-grown larva. No cell with provisions was found. Another nest in the same location was observed near Boma.

48. **Odynerus (Rygchium) carinulatus** Saussure

♀.— Head: Fig. 163. Clypeus very broad, about one and one-half times as broad as long; subelliptic; slightly swollen; moderately narrowed towards its apical margin; this apical margin broad, measuring about one-third of the total width of the clypeus, distinctly emarginate, with projecting, sharp or blunt edges; clypeus without carinæ; very strongly and densely punctate, the sculpture becoming irregularly rugose in its apical half; the punctation much finer towards its upper margin. Vertex much swollen above and behind the eyes; the distance between the lateral ocelli and the hind margin of the vertex about two and one-half times that separating the posterior ocelli from the eyes. On the vertex a flattened crescent-shaped depression extending from near the hind margin of the head towards the upper angle of the eyes, and in this crescent, on the middle line, two very small foveæ broadly separated from each other. Maxillary palpi six-jointed, their four terminal joints



Figs. 163–168. *Odynerus carinulatus* Saussure.

Fig. 163. Head in front, ♀. Fig. 164. Head in front, ♂. Fig. 165. Antenna, ♂. Fig. 166. Middle femur, ♂, in front. Fig. 167. Venation of front wing, ♀. Fig. 168. Terminal joints of antenna, ♂.

very gradually decreasing in length; labial palpi distinctly four-jointed. Mandibles short and broad; much shorter than the great ocular diameter; with a broad, blunt apex, which is slightly curved downward; four very bluntly rounded teeth on their terminal half, along their inner margin. Antennæ short, with moderately swollen flagellum; third joint short, scarcely one and one-half times as long as the fourth; the following joints as broad as, or broader than, long. Head and thorax uniformly and densely covered with very strong punctures; nearly rugosely reticulate.

Thorax short and broad; subquadrate, as seen from above. Anterior margin of the pronotum truncate; with a distinctly carinate margin, and very strong, sharply projecting, lateral angles. Epicnemia of the anterior legs bordered by a raised carina of the mesopleura, this carina continuing on the mesonotum. Mesonotum with a slight anterior groove on its middle and two very strongly raised carinæ on the middle part of its posterior two-thirds; these carinæ converge towards the scutellum, which they do not reach. Scutellum swollen; pillow-like; very slightly depressed on its middle, where there is a very fine longitudinal furrow; on each side of this middle part the sides of the scutellum are gradually raised to form an indication of very broad, lateral tubercles. The hind margin of the scutellum is rather abruptly truncate, with a very short vertical face devoid of coarse sculpture. Postscutellum much of the same shape as in *O. ventralis* Saussure, but more obsoletely trituberculate, the longitudinal median carina often indistinct. Propodeum also much as in that species but the striation of its concavity is very fine, the concavity being somewhat shining. Legs short and heavy, with broadened anterior tarsi; the middle and posterior tibiæ on their outside with strong, but short, spines[1] scattered in the short pile. Venation of the front wings: Fig. 167.

Abdomen dull, with very few, very remote, somewhat flattened and superficial punctures; except in front of the posterior margins of tergites two, three, and four, where they are much stronger and more numerous on a distinctly limited, transverse stripe of the middle line. Second abdominal sternite with a saddle-like depression, which is more strongly marked than in *O. ventralis*, the raised, lateral tubercles ending in a much sharper ridge and the depression showing a deep median groove running towards the base of the sternite.

Head, thorax, and legs, dark ferruginous-brown or brownish-red; with indistinct black tinges (more or less extensive) on the apex and inner margin of the mandibles, on the upper side of the flagellum, on the vertex (where there is often a distinct longitudinal median black line), on the sutures of the thorax, and on the mesonotum. The mesonotum may become nearly entirely black, but the raised carinæ are, as a rule, ferruginous. Abdomen almost uniformly pale orange-chrome; the anterior, vertical face of the first tergite darker brown or black; the second sternite sometimes turning darker. Wings uniformly yellow-ferruginous; the apical half of the radial cell with a dark brown, purplish, effulgent spot.

Length (h. + th. + t. 1 + 2), 11 to 13 mm.

The male has been only very briefly described by Magretti.[2] The following description of it is made on several specimens from Lourenzo Marques, in the collection of the Department of Entomology, Cornell University.

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[1] Such tibial spines are very commonly found among fossorial Aculeata; they are rare in the diplopterous wasps, being there best known for several of the Zethinæ.

[2] Ann. Mus. civ. Genova, XXI, 1884, p. 618.

♂.— In its structural characters very similar to the female. Head: Fig. 164. Clypeus more elongate, about as broad as long; subcircular; distinctly swollen on its middle into a feeble transverse ridge; its anterior margin broad, with a deeply arcuate emargination; its lateral projecting edges much sharper than in the female. Clypeus almost impunctate. Vertex much less swollen than in the female; the posterior ocelli scarcely more than twice as far from the hind margin of the head than from the inner margin of the eyes. No hairy foveæ on the vertex. Inner margin of the mandibles with two bluntly rounded, feeble teeth in front of their recurved apex. Antennæ (Fig. 165) slightly longer than in the female; the joints of the flagellum feebly constricted; the fourth, fifth, and sixth distinctly longer than broad. Terminal hook-like joint (Fig. 168) short and thick; feebly curved; with a blunt, rounded apex; scarcely attaining the apex of the tenth antennal joint when folded on the under side of the flagellum. Second abdominal sternite as in the female. Legs much more slender than in the female, especially their tarsi; middle femora (Fig. 166) about of the shape of the other femora, only slightly swollen beneath on their apical half; their basal half scarcely depressed and arcuate on their under side, not saddle-shaped. The remaining as in the female.

The coloration also is very much the same as in the female, but the clypeus is ivory-white, becoming somewhat ferruginous towards its margins.

Length (h. + th. + t. 1 + 2), 8.5 to 10 mm.

Belgian Congo.— Malela, 1 ♀, July 1915; Boma, 2 ♀♀, June 1915 (Lang and Chapin Coll.).

Odynerus ventralis Saussure and *O. carinulatus* Saussure belong to a group of species evidently closely related to each other and forming a natural section, in which may be included also *O. forticulus* (Kohl), *O. bothriogaster* Schletterer, and *O. anceps* (Gribodo). In all these species the structure and shape of the thorax are very similar, the mesonotum having two raised carinæ; besides, the second abdominal tergite has a saddle-like median depression. In comparing the description given above with that of *Odynerus bothriogaster* Schletterer, it will be apparent that the sculptural characters agree perfectly. I am even inclined to believe that Schletterer's species is only a striking color variety of *carinulatus* Saussure, in which head and thorax are richly ornate with yellow, and the color of the abdomen also becomes partly yellowish.

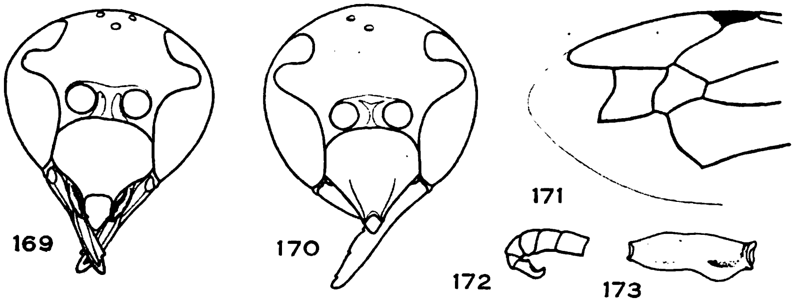
Rhynchium stironotum P. Cameron, from Transvaal, has, according to the author, "two keels down the centre of the mesonotum" and is undoubtedly a synonym of *O. carinulatus* Saussure, which is not rare in South Africa. I have seen numerous specimens of *O. carinulatus* from Lourenzo Marques which agree in every respect with Cameron's description of *R. stironotum.*

Further synonyms of *Odynerus carinulatus* Saussure may be *Rhynchium rubens* Saussure and *Rhynchium rufiventre* Radoszkowsky, but the presence of two raised carinæ on the mesonotum is not clearly indicated in the descriptions of these species.

49. **Odynerus (Rygchium) hyacintæ** Gribodo

I refer to this species one female and one male bred from a clay nest found in the Ituri Forest. Both of these specimens agree sufficiently with Gribodo's excellent description; I shall only call attention to the most important structural characters, since the species may prove to have been described under some other name.

♀.— Head (Fig. 170) of the ordinary shape. The posterior ocelli only slightly more removed from the hind margin of the vertex than from the inner margin of the eyes; distinctly closer to each other than to the eyes. No hairy fovea on the vertex. Clypeus nearly as broad as long; strongly convex; its inferior half with two strong, longitudinal carinæ, which end in sharply projecting teeth on either side of its deeply, arcuately emarginate apex. Mandibles very long, longer than the great ocular diameter; with feebly curved, blunt apex and a faint indication of three notches along their inner margin. Maxillary palpi with their two basal joints very long; the third to sixth successively shorter; the three terminal ones being together slightly longer than the third. The temples behind the eyes are margined by a very sharp raised carina, which, however, stops far from the vertex; the vertex itself having no raised margin behind. Third joint of the antennæ not quite one and one-half times as long as the following joint.



Figs. 169–173. *Odynerus hyacintæ* Gribodo.

Fig. 169. Head in front, ♂. Fig. 170. Head in front, ♀. Fig. 171. Venation of front wing, ♀. Fig. 172. Terminal joints of the antenna, ♂. Fig. 173. Middle femur, ♂.

Thorax subquadrate; slightly longer than broad, as seen from above. Anterior margin of the pronotum truncate, sharply margined, and with strongly projecting, blunt, lateral angles; much as in *O. carinulatus*. The epicnemia of the front legs are distinctly depressed and smooth, but the delimiting raised carina is only visible on the inferior half of the mesopleura and on the mesosternum, becoming obsolete in their upper half; these carinæ are much less developed than in *O. carinulatus*. Mesonotum without longitudinal carinæ. Scutellum flat, only feebly swollen towards its middle, with a distinct and narrow median line. Postscutellum short, transverse; its horizontal portion scarcely shorter than its vertical part, the two being separated by a projecting, sharp, transverse ridge, which is irregularly crenulate; its horizontal part in front of the ridge very coarsely rugose; its vertical part smooth and shining. Propodeum short, not extended behind the postscutellum; its lateral dorsal areas being widely separated on the middle line. Concavity of the propodeum distinct, smooth, and shining. Its lateral and superior ridges are rounded; its dorsal lateral areas not delimited by raised carinæ, rugosely reticulate all over, as are also its ventral lateral areas. The lateral angles of the propodeum are scarcely projecting; rounded and somewhat denticulate; between these angles and the valvula of the abdomen, the inferior ridges of the propodeum are slightly raised and irregularly crenulate. The terminal tooth of each ridge, above the valvula, is much stronger than the others, somewhat widened and obliquely truncate at its apex.

Legs heavily built; the middle tibiæ with a single apical spur; all the tibiæ and femora swollen; the front femora strongly swollen and curved; the middle femora flattened on their anterior face in their basal two-thirds, their apical third presenting anteriorly a strong, elongate expansion. Tibiæ not spiny on their outer face. Wing venation: Fig. 171.

Abdomen broad and short; vertically rounded and truncate on the anterior face of its first tergite. The second sternite strongly depressed on its median, basal part; much as in *O. carinulatus* but its lateral tubercles not so strongly carinate.

Head and thorax opaque; covered with strong, subreticulate punctures, except on the anterior face of the prothorax, on the concavity of the propodeum and the epicnemial depressions of the pleura, which are smooth and shining. Clypeus with a few irregular punctures, becoming somewhat striate between the longitudinal carinæ near its apex. First tergite impunctate; the following tergites with a few superficial punctures uniformly scattered all over, except for a distinct, broad, apical, smooth margin on tergites 2 and 3; the punctation, however, nearly completely hidden by a bright, golden-yellow, appressed tomentum. Punctation on the sternites much stronger, especially on the sternite 2 where it is coarse and remote. Head and thorax with a light, grayish, somewhat silvery bloom; thorax on its upper side with golden tomentum.

Head, thorax and legs deep jade-black; the apex of the clypeus and the under side of the antennal scape ferruginous; the tegulæ brownish-black. Abdomen orange; the vertical, basal face of the first tergite and the larger part of the sternites black. In the specimen I have seen there can be no doubt that the orange-brown color belongs to the integument and not only to the bright golden tomentum. Postscutellum yellow; wings uniformly smoky, with a bright, golden and purplish effulgence; the veins black-brown.

Length (h. + th. + t. 1 + 2), 11 mm.

♂.— Differs very little from the female. Head: Fig. 169. Clypeus slightly broader than long; scarcely emarginate at its apex which ends in two widely separated, small teeth; without carinæ. Inner margin of the mandibles strongly thickened and raised on its basal third into a projecting lamella which forms a slightly curved, blunt tooth on each side of the labrum. Antennæ elongate; most of the joints of the flagellum longer than broad; the terminal, hook-like joint very long and thickened at its base into a projecting internal tooth, its apex long, curved, and somewhat twisted (Fig. 172); when folded on the under side of the flagellum, the apex of the hook reaches the base of the ninth antennal joint. The middle femora (Fig. 173) have a shape similar to that of the female, but are somewhat more swollen.

Sculpture much as in the female, but the clypeus smooth, impunctate.

Coloration very similar to that of the female. Clypeus and a short streak in the under part of the inner orbits ivory-yellow.

Length (h. + th. + t. 1 + 2), 11 mm.

Belgian Congo.— Penge, 1 ♀ and 1 ♂, bred from a nest, February 16, 1914 (J. Bequaert Coll.).

Vespa aurata Fabricius, which according to W. A. Schulz[1] is an *Odynerus*, may be the same as *O. hyacintæ* Gribodo. Fabricius'[2] very short description is as follows:

> V. nigra, abdomine aureo nitido.
>
> Hab. in Sierra Leon, Africæ, D. Pflug.
>
> Statura omnino *V. calidæ* at duplo minor. Caput, thorax, alæ nigra, immaculata. Abdomen subpubescens, aureum, immaculatum. Pedes nigri.

Since Fabricius' type is still in existence in the Copenhagen Museum, it will be possible to fix its identity either with this or with some other similarly colored Ethiopian species. See p. 126 for remarks on several species of *Odynerus* with a similar coloration (group VI).

Ethology. The nest of *O. hyacintæ* was found in the rain forest at Penge fixed beneath the roof of a mushroom-shaped termitarium. It was a free lump of mud in which the cells were placed parallel to each other so as to have their openings all directed upwards. The observed nest had seven cells, a central one surrounded by the six others; the walls of the cells were thin and smooth on their inner side; outwardly the whole of the nest was thinly plastered with a resinous, viscous, black substance, evidently the latex of some plant. A similar nest, probably built by the same species of wasp, was previously found in the forest at Kibombo (November 1910) fixed on the bark of a tree. The prey was not observed.

In general shape and on account of the viscid external covering, the nest of this species is very similar to that of *Odynerus* (*Rygchium*) *nitidulus* (Fabricius) from India.[3]

50. **Odynerus (Rygchium) emeryanus** Gribodo

In the collection of the Congo Expedition there is a female *Odynerus* which, for its morphological characters, agrees perfectly with the description and drawings of *O. benitensis* A. v. Schulthess[4]; its coloration differs only in a few minor details. However, in looking over the older descriptions, I found the Congo specimen to fit also that of *O. emeryanus* Gribodo.[1] Though Gribodo's description is much less complete, it is still sufficiently clear to allow the conclusion that his species is really identical with v. Schulthess' *benitensis.*

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[1] Berliner entom. Zeitschr., LVII, 1912, p. 82.

[2] Mantissa Insect., I, 1787, p. 289.

[3] C. Horne and F. Smith, Trans. Zool. Soc. London, 1870, VII, pt. 3, p. 168, Pl. xx, figs. 1 and 1a.

[4] Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 348, figs. 10–12.

♀.— Head as broad as the thorax; temples on the head as seen in profile about as broad as the eyes, distinctly margined by a raised carina which continues, although less distinctly, behind the vertex. Clypeus slightly broader than long, triangular; very feebly convex and without any trace of longitudinal carinæ; its apex straightly truncate, of the length of the third antennal joint. Posterior ocelli distinctly closer to each other than to the eyes; one and one-half times as far from the hind margin of the vertex as from the inner margin of the eyes. Vertex with a broad and shallow fovea on its posterior half. Third joint of the antennæ one and one-half times as long as the fourth. Mandibles and mouth parts much as in *O. hyacintæ.*

Thorax almost quadrate, hardly longer than broad as seen from above. Anterior margin of the pronotum sharply margined, with bluntly rounded lateral angles. Epicnemia of the front legs only faintly margined on the inferior half of the mesopleura. Mesonotum without carinæ or parapsidal grooves. Scutellum flattened, only with a faint trace of a median line in its anterior half. Postscutellum very short, transverse; with an exceedingly short, anterior, horizontal portion, and a much longer, posterior, vertical face; the ridge between both slightly sloping and projecting above the concavity of the propodeum; this ridge is finely and sharply serrulate, and feebly depressed in the middle so as to form two transverse protuberances. Propodeum very short, its concavity feeble. Its lateral, inferior, and superior ridges, as also its lateral angles hardly marked and broadly rounded. No trace of teeth or crenulations above the valvula.

Legs moderately heavy, the tibiæ and femora only feebly swollen and normal. The middle femora without expansion in their apical third, feebly flattened on their posterior face in their basal third. Tibiæ with a row of short, stout spines along their outer face.

Abdomen broad, its first segment slightly narrower than the second. First tergite vertically truncate on its anterior face; its posterior, horizontal part nearly three times as broad as long. Second sternite without median depression or lateral protuberances; rather abruptly vertical towards its base; bluntly rounded between its vertical and horizontal portions.

Punctation of head and thorax very coarse and dense, almost uniformly subreticulate. Clypeus smooth and shining, with very minute, scattered punctures. Tegulæ shining, very minutely punctate, with a few stronger punctures near their inner margin. Anterior face of the pronotum, epicnemia of the front and middle legs, and vertical face of the postscutellum, shining and impunctate. Concavity of the propodeum dull, densely and finely striate. Abdomen covered with minute, shallow punctures; those on the first tergite much finer; those on the second sternite coarser; the second and following segments end in a broad, impunctate margin. The entire body is shining, almost destitute of pubescence; the dorsal face of the abdomen especially is very glossy. Head and thorax bear a few grayish hairs, which become longer and somewhat silvery on the lower parts of the temples, on the sternum and the angles of the propodeum. Clypeus and dorsal face of the abdomen almost bare. Ventral face of the abdomen and legs with short, scattered, golden-yellow hairs.

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[1] Bull. Soc. ent. Italiana, XXIII, 1891, p. 293.

Head, including the antennæ, and almost the entire thorax, black. Abdomen entirely and legs for the larger part, bright ferruginous-red (English red of Ridgway's scale); the under side of the abdomen paler. Coxæ and upper face of the tibiæ, brownish-black. Middle part of the mandibles, apex of the clypeus, and under side of the antennal scape, ferruginous. A triangular spot on each side of the basal half of the clypeus, a large spot on the base of the mandibles, two minute frontal dots above the insertion of the antennæ, a stripe in the inferior part of the emargination of the eyes and another in the upper part of the temples, a narrow spot on each side of the middle line near the carinate margin of the pronotum, a rounded spot on the mesopleura near the base of the wings, and a line on each of the elongate protuberances of the postscutellum, cream-buff or ivory-white. Wings uniformly violaceous black.

Length (h. + th. + t. 1 + 2), 10 mm.

According to A. v. Schulthess, the male is very similar to the female. The clypeus is also broadly truncate at its apex. The apical, hook-like joint of the antennæ is very narrow, feebly curved, scarcely reaching the base of the eleventh joint. Base of the mandibles without projecting lamella near their inner margin.

Belgian Congo.— Stanleyville, 1 ♀, March 1915 (Lang and Chapin Coll.).

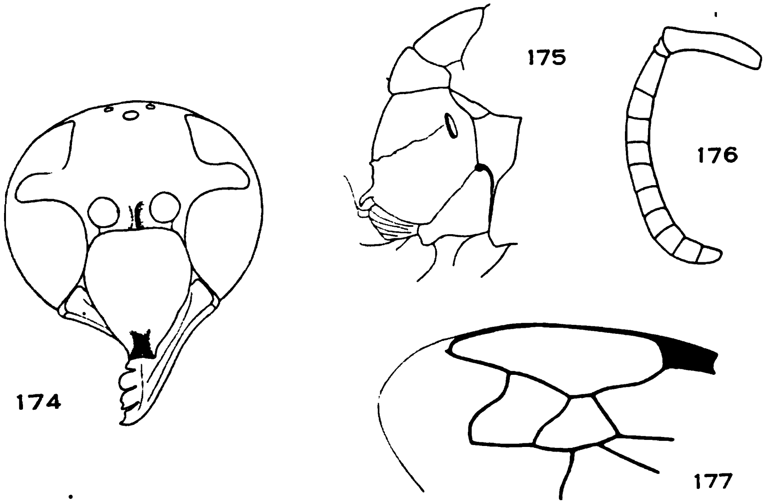
This species is allied to *O. hyacintæ* Gribodo, the chief differences being found in the shape of the clypeus and middle femora of both sexes; and also of the mandibles and apical joint of the antennæ in the male.

O. emeryanus was known from Sierra Leone and Spanish Guinea. Being now recorded from the central part of the Congo basin, it probably ranges over the whole of the West African rain forest.

51. **Odynerus (Rygchium) rufoniger,** new species

♀.— Head (Fig. 174) subcircular. Clypeus slightly higher than broad; piriform; its larger width in its upper third; its lateral inferior margin strongly converging towards its apex; this apical margin narrow, truncate, very feebly sinuate on its middle, with bluntly projecting lateral edges which end in very short, longitudinal carinæ. Vertex moderately developed; with a deep, crescent-shaped, hairy fovea. Posterior ocelli about as far from each other as from the inner margin of the eyes, but more than twice as far from the hind margin of the vertex. Front with a sharp, median carina between the insertion of the antennæ. Temples and lateral parts of the vertex margined by a raised carina, which becomes obsolete on the middle line. Mouth parts very similar to those of *O. synagroides* (Saussure); the labial palpi distinctly 4-jointed; the maxillary palpi 6-jointed, with their three terminal joints very small, together much shorter than their third joint. Mandibles robust; long; beak-like; slightly longer than the great ocular diameter; with three blunt, broad teeth along their inner margin before their pointed apex. Antennæ (Fig. 176) moderately long; their third joint about as long as the fourth and fifth together; their flagellum scarcely swollen towards its apex.

Thorax elliptical; distinctly longer than broad. Pronotum distinctly narrowed towards its anterior margin which bears a feeble transverse carina; its lateral angles bluntly rounded, not projecting. Mesonotum and scutellum flat; no distinct parapsidal furrows; a very narrow, depressed, median line on the scutellum. Postscutellum feebly convex, sloping almost gradually from its base towards its apical margin; without distinct ridge, teeth, or tubercles. Mesopleura with a carina bordering the epicnemia of the middle legs in their inferior part. Propodeum (Fig. 175) moderately developed; its dorsal areas broadly separated on the middle line by the sloping face of the postscutellum; its superior ridges rounded; its lateral and inferior ridges distinct, but not raised into sharp carinæ; its lateral angles very feebly marked, with a small tooth. Below each lateral angle the inferior ridge ends in a long, narrow, strongly curved spine which is directed downwards. Concavity of the propodeum deep; densely covered with fine transverse striæ. Dorsal areas of the propodeum rugosely punctate all over; its lateral areas with an extremely minute, transverse striation. Legs normal, rather long and slender; the hind coxæ with a fine carina on their upper face but without projecting tooth. Middle tibiæ with one apical spur. Claws with a distinct tooth before their apex. Wing venation (Fig. 177) of the ordinary type; the second cubital cell comparatively long.



Figs. 174–177. *Odynerus rufoniger*, new species.

Fig. 174. Head in front, ♀. Fig. 175. Scutellum, postscutellum, and propodeum in profile, ♀. Fig. 176. Antenna, ♀. Fig. 177. Venation of front wing, ♀.

Abdomen elongate; shaped much as in *Synagris*. First segment only slightly wider than long and broadly convex at its base; nearly hemispherical; its swollen anterior part fitting in the concavity of the propodeum when the abdomen is bent upward. Second segment very much broader than the first, distinctly narrowed towards its base. The second sternite moderately, although distinctly, depressed on its middle; without median furrow; its lateral ridges not carinate and very gradually sloping towards the base (in profile almost as in *O. anceps*, Fig. 154).

Punctation very coarse and dense on head and thorax; almost reticulately rugose on the postscutellum. Clypeus covered uniformly with very strong elongate punctures, with a very distinct, longitudinal, shining groove between the apical carinæ. Abdomen densely covered with moderately strong punctures, those on the second sternite more remote.

Coloration almost exactly as in *Synagris versicolor* A. v. Schulthess. Deep black; with the clypeus, antennæ, a frontal spot above the median carina, an elongate spot on the temples, pronotum, tegulæ, scutellum, postscutellum, mesopleura, propodeum, legs, and first abdominal segment (except for the apical margins of its tergite), bright ferruginous-red. Mandibles and sutures of the thorax, fuscous. Wings uniformly dark smoky, with a moderate, purplish effulgence.

Length (h. + th. + t. 1 + 2), 13 to 14 mm.

♂ unknown.

Belgian Congo.— Description based on 7 ♀ ♀ from Stanleyville, April 1915 (Lang and Chapin Coll.).

These seven specimens are colored almost exactly alike and their resemblance in coloration, size, general shape, and even in many of their structural characters, to *Synagris versicolor* A. v. Schulthess is very deceiving. Fortunately, specimens of *Synagris versicolor* from the same locality were also found in the collection, so that it was possible to make out definitely the differences between them. Above all, *S. versicolor* A. v. Schulthess is a true *Synagris* as regards the mouth parts (5 joints on the maxillary palpi and 3 on the labial palpi); the shape of the clypeus and mandibles also is very different; but it is, nevertheless, extremely remarkable that these two species are so similar with regard to the structure of the postscutellum, propodeum, and abdomen. One would be inclined to believe that they belong together in a natural group of species and that our present generic distinction between *Odynerus* and *Synagris*, which is merely based on the structure of the mouth parts, is artificial.

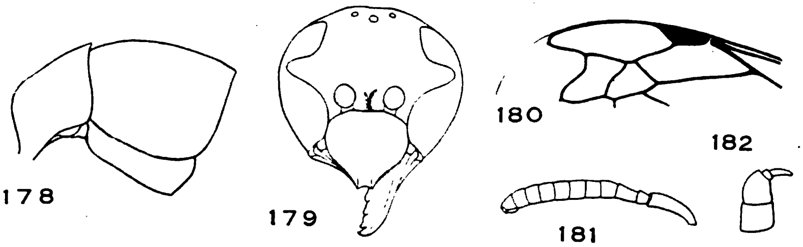
O. rufoniger is still very different from the similarly colored *Synagris rufopicta* Tullgren and *Synagris huberti* Saussure var. *clypeata* (Mocsáry), of which also I have been able to see specimens. I cannot, however, make such definite statements for several other African wasps presenting the same color pattern (See the list of group V, p. 126) and which I know only from the descriptions. *Odynerus uncatus* (Tullgren) is, I believe, very closely related, if not identical, with the wasp described here as new; but it would be hazardous to unite them at present.

52. **Odynerus (Rygchium) desperatus,** new species

♀.— Head: Fig. 179. Clypeus shortly piriform; slightly longer than broad; convexly swollen; its apical margin about one-quarter of the total width of the clypeus; subtruncate; very feebly sinuate; with broadly rounded, blunt edges;

these edges with a very feeble longitudinal ridge, but without carina. Inner margins of the eyes distinctly more remote on the vertex than on the clypeus. Vertex normal; with a small, feebly hairy fovea; the posterior ocelli about as far from each other as from the inner margin of the eyes, slightly more remote from the hind margin of the vertex. Temples normal; feebly swollen in their upper part; margined behind by a sharp carina, which continues behind the vertex. Mandibles comparatively short, not as long as the great ocular diameter; with distinctly curved apex; its inner margin with three blunt teeth. Antennæ with comparatively short and swollen flagellum; their third joint short, not one and one-half times as long as the fourth. Mouth parts as in *O. sheffieldi* (Figs. 191 and 192).

Thorax slightly longer than broad; flattened above. Anterior margin of the pronotum truncate; straight; margined by a minute, decolorate carina; its lateral angles broadly rounded. Mesonotum without parapsidal furrows. Scutellum flat; sometimes with a minute median line. Postscutellum transversely triangular; feebly convex; its anterior horizontal portion short; its posterior part gradually sloping; the ridge between both forming a feebly raised, continuous, arcuate line, which is finely crenulate and not depressed on its middle. Propodeum short; almost without median concavity; its sides feebly convex, broadly rounded, without raised ridges or projecting lateral angles. Epicnemia of the front legs feebly marked, and the inferior part of the mesopleura with an anterior, faint carina. Legs normal; the hind coxæ with a feeble tooth on their upper face; the claws deeply bifid before their apex. Wing venation: Fig. 180.



Figs. 178–182. *Odynerus desperatus*, new species.

Fig. 178. Two basal abdominal segments in profile, ♀. Fig. 179. Head in front, ♀. Fig. 180. Venation of the front wing, ♀. Fig. 181. Antenna, ♂. Fig. 182. Terminal joints of antenna, ♂.

Abdomen rather short and heavily built, as in the related species. First segment elongate; cup-shaped; broadly rounded towards its base. Second segment slightly broader than long; its sternite (Fig. 178) convexly rounded towards its base; without median saddle or lateral tubercles.

Punctation strong and coarse on head and thorax, giving to these parts a rugosely reticulate appearance, especially distinct on vertex, mesonotum, and lateral areas of the propodeum; the punctation of the clypeus also is abundant, rather superficial, producing a substriate irregular surface, especially towards its apex. Concavity of the propodeum minutely, transversely striate. Tegulæ with a few strong punctures in their posterior part. Abdomen practically impunctate on its dorsal face; the second tergite only with very few superficial punctures, which become more distinct toward its posterior sides. Second sternite very strongly and distinctly punctate.

Coloration, for the most part, dark ferruginous-red, more or less turning into black; the vertex, mesonotum, and base of first and second tergites are mostly black. The yellowish marks are very reduced: a narrow transverse band at the base of the clypeus (sometimes absent); sometimes a small dot on the front or in the emargination of the eyes; a narrow, anterior margin on the pronotum; the extreme anterior angle of the tegulæ; the posttegulæ; an indistinct, transverse band on the postscutellum; often a small dot on the sides of the propodeum; narrow preapical bands on tergites 1 and 2 and on sternite 2, these bands not broadened on the sides; and a narrow line on the outer side of the front and middle tibiæ. There are no lateral free spots on tergites 1 and 2. Wings subhyaline, with a smoky, purplish spot in the radial cell.

Length (h. + th. + t. 1 + 2), 9 to 10 mm.

♂.— Similar to the female. Head and clypeus very much as in the female. The inferior part of the clypeus in front of its apex depressed; flat; somewhat decolorate; its lateral edges more distinctly raised. The apex of the clypeus, therefore, apparently emarginate. Vertex without fovea. Antennæ (Fig. 181) short; their flagellum distinctly swollen; third joint not one and one-half times as long as the fourth; most of the following joints about as broad as long. Terminal hook-like joint (Fig. 182) very small; short and narrow; straight; reaching with its blunt apex to the base of the eleventh joint. Legs normal.

Punctation as in the female, even on the clypeus.

Coloration also very similar. The yellowish markings are the same, but more distinct; especially the basal band of the clypeus.

Length (h. + th. + t. 1 + 2), 7.5 to 8 mm.

Belgian Congo.— Stanleyville, 1 ♀ and 3 ♂ ♂, April 1915; Banana, 1 ♂, July 1915; Gamangui, 1 ♀; Poko, 1 ♀ (Lang and Chapin Coll.). Lubutu, 1 ♀, January 1915; Walikale, 1 ♀, January 1915; Lesse, 1 ♀, August 1914; Kambi na Mambuti (between Penge and Irumu), 1 ♀, March 1, 1914 (J. Bequaert Coll.).

The holotype is a ♀ from Stanleyville, the allotype a ♂ from the same locality.

At Kambi na Mambuti these little wasps were commonly nesting in galleries burrowed in wooden pillars of houses; their prey consisted of entire, paralyzed caterpillars.

It is very likely that this species was previously described, since it is of such common occurrence in the Congo forest. Owing to the imperfect descriptions of the majority of African species of *Odynerus* and to the fact that there are apparently in this group numerous species, closely related although distinct, it is impossible in most cases to use any of the published names. The species here described as new was at first thought to be *O. hottentotus* Saussure, to which one is brought by using Meade Waldo's key.[1] However, Dr. H. Brauns has recently sent me the true South African *hottentotus*. The following table shows the most striking differences between these two species:

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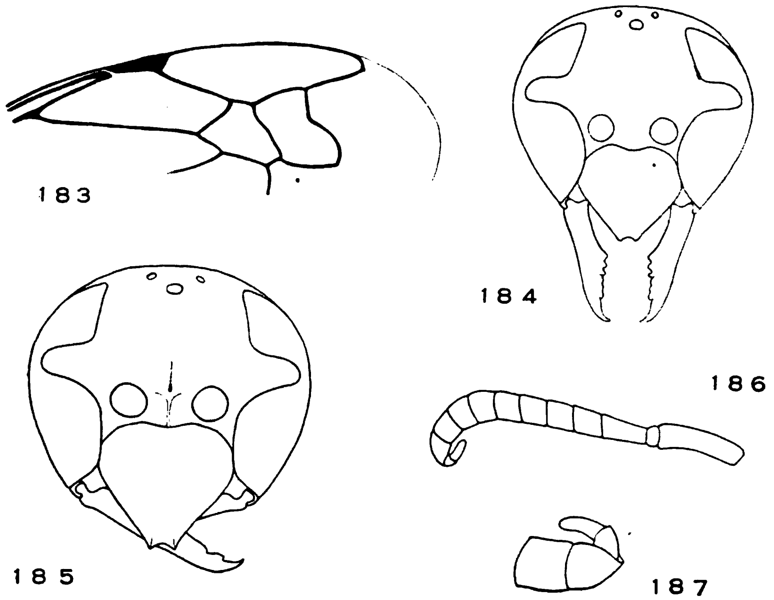
[1] Trans. Ent. Soc. London, (1914), pp. 489–498.

O. desperatus, new species.	*O. hottentotus*, Saussure.
♀ and ♂	♀ and ♂
Head, as seen in front, scarcely broader than high; the vertex distinctly swollen.	Head, as seen in front, distinctly broader than high; the vertex not swollen, feebly raised above the upper edges of the eyes.
Front with a median carina between the insertion of the antennæ.	Front without median carina, only feebly raised, and flattened between the insertion of the antennæ.
Anterior margin of the pronotum raised into a narrow, decolorate lamella.	Anterior margin of the pronotum rounded, not lamelliform.
Mesonotum and scutellum rather flattened above, the mesonotum about as broad as long.	Mesonotum and scutellum slightly convex above, the mesonotum longer than wide.
Apical margin of first and second abdominal tergites thin, flattened, decolorate.	Apical margin of first and second tergites swollen, the margin of the second slightly reflexed.
Second abdominal tergite gradually convex towards its base.	Second abdominal tergite much swollen, rather abruptly convex towards its base.
Sculpture of head and thorax moderately strong; the mesonotum and pleura not rugose. Dorsal face of the abdomen practically impunctate; the second tergite only with a very few superficial punctures.	Sculpture very strong on head and thorax; the mesonotum almost longitudinally striate. Dorsal face of the abdomen distinctly punctate all over.
Pubescence not very dense and not silvery.	Pubescence dense, long, and silvery, especially on the clypeus, pleura, and propodeum.
♀	♀
Apical margin of the clypeus feebly sinuate, about one-quarter of the total width of the clypeus, its blunt edges feebly carinate.	Apical margin of the clypeus straightly truncate, about one-third of the width of the clypeus, its edges not carinate.
♂	♂
Apical margin of the clypeus only slightly different from that of the ♀, a little more emarginate.	Apical margin of the clypeus very deeply, semicircularly emarginate, with sharp lateral edges.
Terminal joints of the antennæ not excavated beneath, their apical hook small, straight, only reaching to the base of the eleventh joint.	Terminal joints of the antennæ excavated beneath, their apical hook long and curved.
Middle femora normally convex on their front side, without ridge.	Middle femora distinctly flattened on their anterior and their inferior side, both faces being separated by a sharp ridge.
Middle tibiæ without dense patch of hairs near their apex.	Middle tibiæ covered with dense and long white hairs along their inner margin in their terminal half.

This table shows also the morphological features by which the true *O. hottentotus* Saussure can be separated from other related species described in this paper.

53. **Odynerus (Rygchium) ueleensis,** new species

♀.—Head: Fig. 185. Clypeus piriform; convex; about as long as broad; distinctly narrowed towards its apex, which has only one-quarter of the width of the clypeus and which is distinctly, although feebly, arcuately emarginate; its lateral edges sharply projecting, raised into short, longitudinal carinæ. Vertex broad, with a deep, shining fovea; posterior ocelli as far from each other as from the inner margin of the eyes, much more remote from the hind margin of the vertex. Temples moderately swollen. Temples and vertex margined behind by a sharp raised carina. Mandibles comparatively short, not as long as the great ocular diameter; with three blunt teeth before their feebly curved apex. Antennæ of the normal type; their flagellum feebly swollen; their third joint one and one-half times as long as the fourth.



Figs. 183–187. *Odynerus ueleensis*, new species.

Fig. 183. Venation of front wing, ♀. Fig. 184. Head in front, ♂. Fig. 185. Head in front, ♀. Fig. 186. Antenna, ♂. Fig. 187. Terminal joints of antenna, ♂.

Thorax distinctly longer than broad or high; flattened above. Anterior margin of the pronotum broadly truncate; with a sharply raised carina, which projects as a minute tooth on each of the lateral angles; these angles otherwise broadly rounded. Mesonotum without parapsidal furrows. Scutellum flat; without any tubercles or carinæ; with a faint trace of median line. Postscutellum transversely triangular; pillow-like; swollen into a transverse, curved, minutely crenulate ridge, which is depressed into a median saddle. Propodeum short; with a swollen median concavity; broadly rounded; without raised ridges or projecting lateral angles. Epicnemia of the front legs indistinct; not bordered by a raised carina of the anterior part of the mesopleura.

Legs normal. Hind coxæ with a very sharp, erected tooth on their upper face, which is apparently much stronger than in the related species. Claws deeply bifid before their apex. Wing venation (Fig. 183) of the ordinary *Odynerus* type.

Abdomen short and heavily built. Its first segment long, cup-shaped, broadly and convexly rounded towards its base; second segment somewhat broader than long, its sternite gradually depressed towards the base on its middle, without distinct saddle or median furrow.

Punctation: head nearly impunctate; the punctures are very indistinct on front, vertex, and posterior upper part of the temples; they are strong in the emargination of the eyes and on the inferior and anterior portions of the temples. The clypeus also shows only faint traces of a few scattered punctures, being nearly impunctate. Thorax punctate all over; however, only rugosely reticulate on the dorsal areas of the propodeum; on the rest of the thorax the punctures are distinctly remote from each other. Concavity of the propodeum and mesopleura impunctate; the lateral areas of the propodeum with very few, scattered punctures. Tegulæ impunctate, feebly shining. Abdomen practically impunctate on its dorsal face; the second tergite shows only very few, widely distant and very minute punctures scattered all over; on their ventral face, the sternites 2, 3, and 4 present numerous, scattered, strong punctures. The impunctate parts are not shining, but covered with a dull bloom as in *O. angolensis* and *O. desperatus*.

Coloration, for the most part, dark ferruginous-red. A triangular, ocellar spot on the vertex, the apex and inner margin of the mandibles, the mesonotum and the sutures of the thorax, the mesosternum, the second tergite for the most part and some portions of the other segments, the under side of the middle and hind femora, more or less blackish; this color often turns into brownish-red. The clypeus is of a pale yellowish-brown and probably was partly yellow in life. The yellowish markings are much reduced: a narrow band on the posterior margin of the pronotum; part of the tegulæ; the larger part of the postscutellum; a spot on the episterna of the mesopleura beneath the insertion of the wings; broad apical bands on tergites 1 to 5, and on sternites 2 to 4; those on tergites 2 to 5 bisinuate in front; the one on tergite 2 much broadened on the sides towards the base of the segment. There are no free lateral spots on tergites 1 and 2. Wings subhyaline, with a bright golden-yellowish tinge and with a dark purplish spot in the radial cell.

Length (h. + th. + t. 1 + 2), 10 mm.

♂.— Very similar to the female. Head: Fig. 184. Clypeus piriform; feebly convex; its narrow, decolorate, flattened apex distinctly, although feebly, emarginate, with rounded, projecting, not carinate edges. Vertex without fovea. Antennæ (Fig. 186) elongate; their flagellum moderately swollen; third joint one and one-half times as long as the fourth, which is distinctly longer than broad; terminal, hook-like joint (Fig. 187) much as in *O. desperatus*, short, narrow, straight, reaching slightly over the base of the eleventh joint. Legs normal; the hind coxæ also with a very sharp tooth above.

Punctation as in the female; the clypeus entirely impunctate, dull.

Coloration also similar; the yellowish markings richer, covering on the head the whole of the clypeus, a large frontal triangle, a stripe in the lower part of the emargination of the eyes and the outer face of the mandibles; the remainder as in the female.

Length: (h. + th. + t. 1 + 2), 8 mm.

Belgian Congo.— Vankerckhovenville, 2 ♀ ♀, April 1912 (one of them the holotype); Poko, 1 ♂, August 1913 (allotype) (Lang and Chapin Coll.).

This species belongs to the group of *O. bellatulus* Saussure and *O. hottentotus* Saussure, but can readily be separated by the shape of the clypeus and the peculiar punctation. The differences between the allied species can be seen from the key.

54. **Odynerus (Rygchium) alboniger,** new species

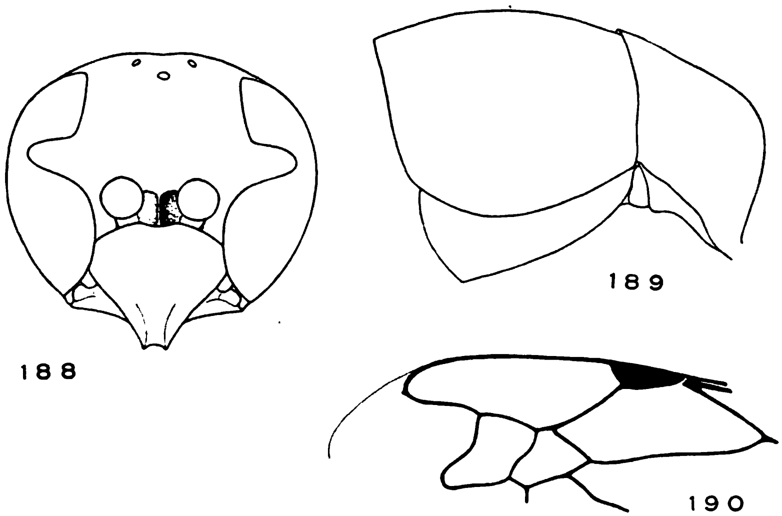
♀.— Head (Fig. 188) subcircular; comparatively broad; slightly broader than the thorax, as seen from above. Clypeus piriform; about as broad as long; convexly swollen in its upper part, depressed in its apical middle portion; its apical margin narrow, more deeply emarginate than in *O. desperatus*, with sharply projecting lateral edges which end in distinct, fine, longitudinal carinæ. Inner margin of the eyes distinctly more remote from each other on the vertex than on the clypeus. Vertex normal; with a deep, but small, almost bare or feebly hairy fovea; the posterior ocelli about as far from each other as from the inner margin of the eyes, nearly twice as far from the hind margin of the vertex. Temples normal; feebly swollen above; margined behind by a sharp carina which continues, but is much less distinct, behind the vertex and is almost invisible on the middle line. Mandibles, antennæ, and mouth parts as described for *O. desperatus* and *O. sheffieldi*.

Thorax much as in *O. desperatus*. Anterior margin of the pronotum sharply raised; mesopleura without raised carina bordering the epicnemia of the front legs. Postscutellum with an arcuately curved, finely crenulate, transverse, continuous line which is not depressed at the middle; this raised line is more distinct and more regularly curved than in *O. desperatus*. Propodeum with its lateral, inferior, and superior ridges, and its lateral angles still more rounded than in *O. desperatus;* its dorsal areas passing very gradually into its concavity, so that it is impossible to trace the limits between them.

Legs, wing venation (Fig. 190), and abdomen almost as in *O. desperatus*. Second abdominal sternite very gradually sloping, almost flattened towards its base (Fig. 189).

Punctation also very similar to that of *O. desperatus*, except for the following points. Punctures of the mesopleura distinctly finer and more remote, the sides of the thorax being shining and almost smooth. Concavity of the propodeum with transverse striæ, which are very distinct in their inferior part, become obsolete above, and pass there into the moderately strong, but dense punctation of the posterior part of the dorsal areas. The anterior portion of the dorsal areas impunctate, but the smooth part does not form a distinctly limited spot. Lateral areas of the propodeum with very fine, remote punctures.

The coloration is very peculiar and almost identical in the four specimens seen, although they were collected in different localities. Black, with almost pure white or ivory-white markings as follows: a broad basal transverse band on the clypeus; a spot in the emargination of the eyes and on the front between the insertion of the antennæ; a long, narrow stripe on the upper part of the temples; a small transverse spot on each side of the middle line along the anterior margin of the pronotum; a small, round spot on the center and another on the upper part of the mesopleura; a dot on the tegulæ; the posttegulæ; a crescent-shaped transverse band on the basal half of the postscutellum; a large, elongate, vertical band on the angles of the propodeum; narrow, preapical, somewhat sinuate bands on tergites 1, 2, and 4, and a free lateral, small rounded spot near the base of the second tergite; also a lateral spot and an interrupted, preapical fascia on the second sternite; an elongate spot on the outer face of middle and hind coxæ; the under side of the femora; a spot near the apex of the tibiæ; and the terminal joint of the tarsi. The apical two-thirds of the clypeus, the antennal scape and the under side of the flagellum, the posterior and anterior margins of the pronotum, and the larger part of the tegulæ, are ferruginous-brown; the sides of the first tergite and the legs are also feebly tinged with brown. Wings subhyaline, darkened in the radial cell.



Figs. 188–190. *Odynerus alboniger*, new species.

Fig. 188. Head in front, ♀. Fig. 189. Venation of front wing, ♀. Fig. 190. Two basal abdominal segments in profile, ♀.

Length (h. + th. + t. 1 + 2), 9.5 to 10.5 mm.

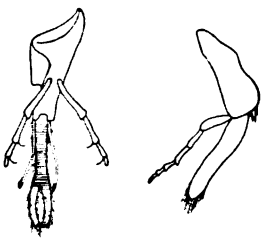
♂ unknown.

Belgian Congo.— The holotype is a ♀ from Thysville, June 1915 (J. Bequaert Coll.). I have also seen 2 ♀ ♀ from Malela, July 1915 and 1 ♀ from Stanleyville, April 1915 (Lang and Chapin Coll.).

This species is closely allied to *O. desperatus* but, I believe, distinct owing to the slight differences indicated above, which I found to be constant in the four specimens I have seen. It is quite possible that it has been already described, but most of the descriptions of apparently related species are so poor that it is not worth while to compare it with them until the type specimens may be more completely studied.

55. **Odynerus (Rygchium) sheffieldi** Meade Waldo

♀.—Clypeus much higher than broad; piriform; flattened towards its apex, which is broadly truncate and scarcely sinuate on its middle; with rounded lateral angles and without carinæ. Mandibles about the length of the great ocular diameter; their apex blunt, feebly curved; their inner margin with three superficial notches. Vertex well developed; with a small, hairy fovea; the posterior ocelli slightly nearer to each other than to the inner margin of the eyes, much more remote from the hind margin of the vertex. Temples broad; distinctly swollen in their upper part; margined behind, the carina however disappearing behind the vertex. Antennæ with a moderately swollen flagellum; their third joint one and one-half times as long as the fourth. Mouth parts: Figs. 191 and 192.



Figs. 191–192. *Odynerus sheffieldi* G. Meade Waldo.

Fig. 191. Labium and labial palpi, ♀. Fig. 192. Maxilla and maxillary palpus, ♀.

Thorax much longer than broad or high. Pronotum truncate anteriorly; nearly quadrate; with feebly projecting lateral angles; its anterior margin raised into a feeble, decolorate carina. Mesonotum without parapsidal furrows. Scutellum broad; flat; without tubercles or carina; with a scarcely visible median line. Postscutellum convex; pillow-like; with a curved transverse ridge, which is minutely crenulate or dentate, scarcely or not at all depressed on its middle; without lateral projections. Propodeum short; with a faintly indicated concavity; its sides broadly rounded, without raised ridges or projecting lateral angles.

Legs normal. Hind coxæ with a rounded tooth on their upper face. Claws deeply bifid before their apex; the inner tooth flattened, lamelliform. Wing venation of the ordinary *Odynerus* type.

Abdomen short and heavily built. Its first segment comparatively long; broadly rounded towards its base; its tergite with a feeble median depressed line near its apex. Second segment distinctly broader than long; its sternite convexly rounded towards its base, scarcely depressed on its middle, with a distinct, basal, median furrow.

Punctation very strong and dense. Head and thorax coarsely, rugosely reticulate; the lateral areas of the propodeum also densely punctate. Clypeus covered with numerous, scattered punctures; on its flattened, median and inferior part the space between the punctures is shining, smooth, and feebly undulate through a superficial longitudinal striation. The first, second, and third tergites of the abdomen are remotely, but distinctly, punctate all over, the punctation becoming denser and coarser on a preapical zone of tergites 2 and 3; the punctation is much less distinct on the first tergite than on the second. The following segments are nearly impunctate. Tegulæ smooth, shining, nearly impunctate.

These structural characters are present almost without variation in 6 ♀♀ from the Belgian Congo and also in 1 ♀ from the Upper Senegal and Niger (Bamako.— E. Roubaud Coll.). The coloration, however, is very variable and each of these seven specimens seems to have its own pattern.

Black, with rich ferruginous-red and yellow markings, the ferruginous color sometimes nearly completely invading the black. The yellow markings are as follows: a broad transverse band at the base of the clypeus; a spot on the front above the insertion of the antennæ; a spot at the base of the mandibles; sometimes also a small dot in the upper part of the temples; more rarely the emargination of the eyes and the inner orbits; a more or less extended band on the anterior margin of the pronotum, sometimes much reduced or wanting; rarely also the postscutellum more or less, and indistinct spots on the scutellum or lateral marks on the propodeum; nearly always lateral, large spots in the anterior part of tergites 1 and 2; more or less extended preapical bands on tergites 2 to 4, the lateral spots on tergite 2 being partly fused with the preapical band; and the outer side of the tibiæ. At least the following parts are ferruginous: the larger part of the head, with the clypeus, the mandibles, and antennæ; the thorax very often nearly entirely, the mesonotum being more or less black; the abdominal sternites nearly completely and the tergites 4 to 6; very often the red color invades partly the tergites 1 to 3; and the legs nearly completely. Wings slightly infuscate, with a yellowish-golden tinge, the radial cell with a purplish dark spot.

Length (h. + th. + t. 1 + 2), 8.5 to 10 mm.

♂.— Very similar to the female. Clypeus also elongate piriform; distinctly and broadly truncate at its apex; with the same sculpture as in the female. Vertex without fovea. Antennæ moderately elongate, slender; their third joint about one and one-half times as long as the fourth; joints 4 to 8 slightly longer than broad. The flagellum is not rolled up towards its apex; its hook-like terminal joint is long, digitiform, slightly flattened, strongly curved on its middle and somewhat twisted upwardly; its rather blunt apex reaches the base of the tenth joint. Legs normal.

Coloration very similar to that of the female and also variable.

Length (h. + th. + t. 1 + 2), 8 to 8.5 mm.

Belgian Congo.— Thysville, 1 ♀; Stanleyville, 4 ♂♂ and 5 ♀♀; Garamba, 1 ♂; Vankerckhovenville, 1 ♀ (Lang and Chapin Coll.). Boga, 1 ♀ (J. Bequaert Coll.). I have also seen a ♀ from Bamako (Upper Senegal-Niger).

I have followed G. Meade Waldo in separating this species from *O. bellatulus* Saussure on account of the difference in the sculpture of the clypeus and abdomen. The true *O. bellatulus*, which I have not yet seen from the Belgian Congo, has the clypeus also broadly truncate at the apex in both sexes, but the first and second abdominal tergites are smooth, impunctate.

O. sheffieldi is apparently a common species in Central Africa and must have been often confused with *O. bellatulus*, so that it is impossible to indicate its true range.

56. **Odynerus sheffieldi** var. **marginifasciatus**, new variety

♀.— The structural characters and sculpture are the same as in the typical form described above; it differs chiefly by the absence of lateral, yellow spots on tergites 1 and 2. Mostly ferruginous-red. Two longitudinal lines on the front connecting an ocellar dot, three triangular spots on the mesonotum (one on its anterior, two on its posterior margin), most of the sutures of the thorax, and the middle part of tergites 1 to 4 and of sternites 2 and 3 more or less extensively, black. The following markings are yellow: a basal band and two preapical spots on the clypeus; a dot near the base of the mandibles; a band on the anterior margin of the pronotum; the postscutellum for the major part; preapical bands on tergites 1 to 3; the one on tergite 1 somewhat triangular, not reaching the sides; the one on tergite 2 widening on the sides; two preapical spots on the sides of sternite 2; and the outer face of the tibiæ. The lateral spots on tergites 1 and 2 are bright ferruginous-red instead of yellow.

Length (h. + th. + t. 1 + 2), 9 mm.

Belgian Congo.— 1 ♀ from Faradje, January 1913 (holotype), and 1 ♀ from Garamba, July 1914 (Lang and Chapin Coll.).

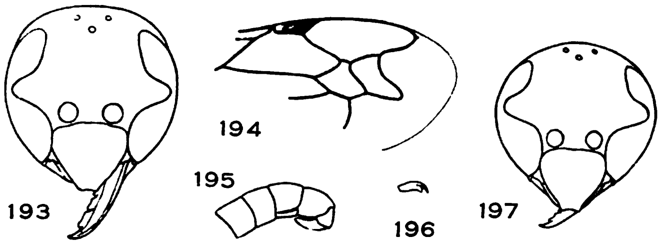
I name this variety chiefly to have the opportunity of stating that the presence or absence of lateral yellow spots on tergites 1 and 2 cannot be used as a specific character in the group of *Odynerus bellatulus*. It is probable that this variety has been described previously as a distinct species; but since structural characters are so rarely included in the descriptions, it is impossible to decide this at present. The coloration of the var. *marginifasciatus* is somewhat similar to that of *O. desperatus*, but in the latter species the shape and sculpture of the clypeus are distinctly different and tergites 1 and 2 are impunctate.

57. **Odynerus (Rygchium) congolensis**, new species

♀.— Head: Fig. 193. Clypeus nearly as broad as high; its apex broadly truncate with blunt lateral edges; this truncate apex has about one-quarter of the total width of the clypeus. Front flattened; only feebly raised above the base of the clypeus. Vertex broad; with a small, median, bare fovea; margined behind. Posterior ocelli about as far from each other as from the inner margin of the eyes, much more remote from the hind margin of the vertex. Temples very broad and somewhat swollen in their upper part, gradually narrowed towards the base of the mandibles; margined by a very strong raised carina. Mandibles about as long as the great ocular diameter; scarcely curved at their blunt apex; their inner margin not distinctly toothed, with three superficial notches. Antennæ normal; their flagellum very feebly swollen; their third joint less than one and one-half times as long as the fourth.

Thorax much longer than broad or high. Pronotum broadly truncate into a straight margin, which is finely raised in a decolorate carina; its lateral angles quadrate, but not projecting; the pronotum is only slightly broadened behind its anterior margin. Mesonotum without parapsidal furrows. Scutellum long; quadrate; flat. Postscutellum semicircular; with a broad, anterior, horizontal face, and a much shorter, sloping, posterior part, the two being separated by a very feeble, gently curved, minutely serrulate or dentate, transverse ridge (or rather by a transverse row of minute teeth), scarcely depressed on its middle. Propodeum short; with a feeble concavity; its sides broadly rounded, without raised ridges or projecting angles; its dorsal lateral areas are somewhat produced above the concavity so as to reach each other behind the postscutellum; however, since the hind part itself of the postscutellum is sloping, the propodeum has no horizontal face.

Legs normal; hind coxæ with a tooth on their upper side. Claws (Fig. 196) deeply bifid at their apex; their inner tooth strongly flattened. Wing venation: Fig. 194; the third cubital cell comparatively high and narrow; the radial cell short and broad.



Figs. 193–197. ***Odynerus congolensis*, new species.**

Fig. 193. Head in front, ♀. **Fig. 194.** Venation of front wing, ♀. **Fig. 195.** Terminal joints of antenna, ♂. **Fig. 196.** Tarsal claw, ♂. **Fig. 197.** Head in front, ♂.

Abdomen of the type found in *O. bellatulus* and *O. sheffieldi.* Its first tergite elongate; broadly rounded towards its base; the terminal part with a faint, median, depressed line. Second segment broader than long; its sternite only feebly depressed near the extreme median base, where it presents a short, but strong, longitudinal groove.

Punctation coarse and dense; subreticulate on head, clypeus, and thorax. The punctation is much finer and more remote on the first abdominal tergites, although still very distinct and abundant, much stronger on the second sternite. Posterior segments impunctate. Tegulæ distinctly punctate.

Black; with very rich yellow markings as follows: clypeus except for a median black spot; a large, elongate, cuneiform spot on the front; spots in the emarginations of the eyes, these spots extending along the inner orbits; the temples nearly entirely; a spot near the base of the mandibles; a very broad, transverse band covering the anterior half of the pronotum; the tegulæ; a spot on each side of the scutellum; nearly the whole of the postscutellum; the dorsal areas of the propodeum; a large spot on the mesopleura covering nearly the whole of the episternum; large lateral spots on tergite 1 and 2, those on tergite 2 fused with the apical band; and preapical narrow bands on tergites 1 to 4, that on tergite 1 triangular, not reaching the sides, that on tergite 4 very short, restricted to the median part. No yellow on the ventral side. The outer side of all the tibiæ and of the end half of the front and middle femora are also yellow. The ferruginous-red color is found on the extreme apex of the clypeus, the mandibles, the antennæ (except for the black upper part of the flagellum towards its apex; the under side of the scape somewhat yellowish), a large spot on each side of the vertex, the inferior half of the temples, the posterior half of the pronotum, the lateral areas of the propodeum, a large spot on the mesopleura, a minute dot on the metapleura, the whole of the first sternite and the basal part of the first tergite, the sides of the fourth tergite, the whole of the fifth and sixth tergites, the three last sternites for the major part, and the legs except for the yellow markings (the inner side of the middle and hind femora blackish, the coxæ with black spots). Wings subhyaline, feebly infumate; the costal and median cell and the stigma bright golden-yellow; the radial cell almost entirely taken by a black, purplish spot.

Length (h. + th. + t. 1 + 2), 8.5 mm.

♂.— Clypeus about as long as broad, broadly truncate at its apex, which is slightly sinuate (Fig. 197); strongly and densely punctate all over. Vertex without fovea. Antennæ of the ordinary shape of the subgenus *Rygchium;* their third joint nearly twice as long as the fourth; the following joints as broad as, or slightly broader than, long; their flagellum moderately swollen over its whole length. Terminal, hook-like joint (Fig. 195) small, cuneiform, feebly curved; its blunt apex reaching a little beyond the base of the eleventh joint; the eleventh joint slightly flattened beneath; the tenth joint with a feeble longitudinal groove on its under side. Legs normal, as in the female. The remainder as in the female.

Coloration similar to that of the female. Clypeus entirely and the under side of the antennal scape, yellow. No yellow spots on temples, propodeum, and sides of first tergite.

Length (h. + th. + t. 1 + 2), 8 mm.

Belgian Congo.— Boma, June 1915, 1 ♀ (holotype); and Stanleyville, 1 ♂, April 1915 (allotype) (Lang and Chapin Coll.). Lubutu, 1 ♂, January 31, 1915 (J. Bequaert Coll.).

This species comes in the group of *O. bellatulus* and *O. hottentotus*. Its nearest relative is *O. sheffieldi* G. Meade Waldo, from which it differs chiefly by the punctation. The clypeus in both sexes is uniformly and densely covered with punctures, without any trace of striæ; the front between the antennæ is sculptured like the vertex; the dorsal areas of the propodeum are almost rugosely punctate. The punctures on tergite 2 are minute, rather dense, and evenly distributed all over; those on sternite 2 are much stronger and closer together. The shape of the antennal hook in the male is also different.

O. congolensis cannot be the same as *O. harrarensis* G. Meade Waldo, since the latter is described as having the "clypeus with fine longitudinal striæ." Other related species are *O. macrocephalus* Gribodo, *O. multicolor* Saussure, and *O. mutans* Saussure, all of which are only superficially known.

58. **Odynerus (Rygchium) falcatus** A. Tullgren

Belgian Congo.— Malela, 5 ♀ ♀, July 1915; Stanleyville, 5 ♀ ♀ and 3 ♂♂, April 1915; Kambi na Mambuti (between Penge and Irumu), March 1, 1914, 2 ♀ ♀.

In the last named locality I observed this species nesting in galleries burrowed in the wooden pillars of a rest house and carrying entire, paralyzed caterpillars as prey.

This wasp has been very completely described and figured by A. v. Schulthess under the name *O. 14-maculatus*, and the numerous specimens which I have seen from the Belgian Congo agree in every respect with this description. *O. falcatus* Tullgren is undoubtedly the same species; the description, although much less accurate, is yet sufficiently clear to allow this conclusion.

O. falcatus Tullgren apparently has a very wide distribution, being known from Old Calabar, throughout Cameroon, Spanish Guinea, the Belgian Congo, and Uganda to Mt. Kenia.

Its coloration is very striking. Deep black, with the following very pale yellow or whitish markings: two lateral spots on the clypeus; a large spot on the smooth portion of the dorsal areas of the propodeum; preapical narrow bands on tergites 1 and 2, much widened and produced anteriorly on their sides; transverse lateral spots on tergites 3 to 6. The preapical bands of tergites 1 and 2 are occasionally interrupted on the middle line. In the male the whitish color covers also the clypeus entirely, the outer face of the mandibles, the under side of the antennal scape, and spots on the legs.

Owing to its structural characters, above all to the shape of the clypeus and the male antennæ, this species belongs in the same group as *O. lateralis* (Fabricius). I believe, however, that it is specifically distinct. The chief differences are in the structure of the propodeum, as indicated in the key. There are also a few minor distinctions in the sculpture of the integument. The clypeus of the female is only faintly, longitudinally striate on its flattened, median part, and the punctures between the striæ are few in number and superficial. The smooth spaces on the propodeum are more extended, in fact cover practically the whole of the dorsal areas; the striation of the concavity of the propodeum is much stronger. The first and second abdominal tergites show a distinct punctation in their posterior part, although the punctures are very scattered. The two following tergites present a broad apical zone of much denser punctures.

Odynerus (Rygchium) lateralis (Fabricius)

There exists in Central Africa a group of variously colored, medium-sized species of *Odynerus,* which agree almost perfectly in their morphological characters. After a careful study of large series of specimens, I propose to consider them all as color varieties of a single species, the structural characters of which are as follows:

♀.— Clypeus broadly piriform; about as broad as long; much narrowed towards its apex, which measures less than one-quarter of the total width of the clypeus; this apex slightly emarginate, with sharply projecting edges in which end strongly raised, but short, longitudinal carinæ. The apical margin itself is strongly depressed; lamelliform between the projecting edges, so that the apex of the clypeus appears to be rather profoundly emarginate. Surface of the clypeus rugose, with a basal zone of scattered punctures; beyond which the punctation is stronger, the pits being somewhat elongate and separated by a maze of irregular longitudinal striæ. Vertex short and narrow; the inner margins of the eyes about as near to each other on the vertex as on the clypeus; the posterior ocelli distinctly farther from each other than from the inner margin of the eyes. Vertex with a large and broad, hairy fovea.

Thorax short and broad; subquadrate; flattened above. Pronotum with a raised carina along its anterior margin; its lateral angles broadly rounded. Scutellum flat. Postscutellum transverse; subtruncate behind; with a short horizontal anterior, and a longer vertical posterior face; the latter is part of the concavity of the propodeum; between both there is a feebly curved, minutely serrulate, continuous ridge. Epicnemia for the front legs feebly marked; not margined behind. Propodeum short; its lateral parts broadly separated by the postscutellum on the middle line; its concavity broad and well-marked, smooth and somewhat shining on its upper part, finely and transversely striate on its inferior half. Lateral, superior, and inferior ridges of the propodeum well marked, crenulate, without sharply raised carinæ; its lateral angles broadly rounded, scarcely projecting.

Abdomen broad and short. Its second sternite feebly depressed on its middle, without distinct lateral tubercles.

Punctation coarse, dense, and subreticulate on head and thorax; tegulæ smooth, impunctate, shining. Very characteristic is a smooth, shining, more or less extended spot on the dorsal areas of the propodeum. Abdomen almost impunctate on its dorsal face; only the sides of tergite 2 and the tergites 3, 4, and 5 with very few, scattered punctures. Punctation on sternite 2 more apparent, although still very scattered.

♂.— Clypeus deeply, semicircularly emarginate at its apex; with sharp tooth-like edges; without carinæ; with only a few scattered, shallow punctures. Vertex slightly broader than in the female; without fovea. Antennæ short; their flagellum distinctly swollen; third joint not one and one-half times as long as the fourth; terminal hook-like joint small, narrow, not curved, its blunt apex reaching the base of the tenth joint. The remaining as in the female.

The following key includes the color variations which I feel sure belong to this structural type:

1. Abdomen without yellow or whitish markings, unicolorous ferruginous-brown or black. East Africa (from Usambara to Portuguese East Africa and Damaraland)....................................var. *unicolor* A. v. Schulthess.
   Abdomen more or less marked with yellow or white......................2.
2. Abdomen brownish-black with two broad, longitudinal, yellow stripes running over the sides of tergites 1 to 6, as in *Odynerus marginellus* (Fabricius). Clypeus of ♀ bright yellow. Senegal, Gaboon, Belgian Congo, Upper Nile. *O. lateralis* (Fabricius).
   Abdomen ferruginous-brown, without broad, lateral, yellow stripes. Only the lateral angles of some of the tergites with small transverse spots near the apical margin. Clypeus of ♂ entirely yellow. Lower Belgian Congo. var. *lateropictus*, new variety.

O. lugubris G. Meade Waldo, which I have not seen, is probably also a color form of *O. lateralis* (Fabricius). The abdomen is described as black, with a pale yellow fascia on the apical margin of tergite 2.

59. **Odynerus lateralis** (Fabricius), typical form

The typical *O. lateralis* (Fabricius) is not very rare in the Belgian Congo. I have seen specimens from Coquilhatville, 1 ♀, May 19, 1915; Stanleyville, 1 ♂, April 1915; and Vankerckhovenville, 1 ♂, April 1912 (Lang and Chapin Coll.). Beni, 1 ♀, April 1914; Kasindi, 1 ♀, August 1914; and Kilo, 1 ♀, July 1914 (J. Bequaert Coll.).

Length (h. + th. + t. 1 + 2): ♀, 9.5 to 11 mm.; ♂, 9.5 mm.

G. Meade Waldo has reinstalled the name *Vespa lateralis* Fabricius for *Odynerus truncatus* Saussure, apparently on good grounds.[1] Another synonym of this typical *O. lateralis* (Fabricius) is, I believe, *Rhynchium furax* Kohl.[2] The details of Kohl's description and the figure which he gives of the head agree in every respect. Kohl records his species from Gaboon and Khartum.

60. **Odynerus lateralis** var. **lateropictus**, new variety

This color form is possibly Radoszkowsky's *Rhynchium ferrugineum*, described from Angola.[3] The description, however, is so fragmentary that it seems hazardous to use this name. I was unable to discover any structural or sculptural difference between this variety and the typical *O. lateralis*, although its color markings are very striking.

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[1] Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 512.

[2] Ann. naturh. Hofmus. Wien, IX, 1894, p. 339.

[3] Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. H. Brauns has sent me, under the name "*Rhynchium ferrugineum* Radoszkowsky," South African specimens of *Odynerus meyeri* Cameron var. *albolimbatus* A. von Schulthess.

♀.— Brownish-black to ferruginous. Rather ferruginous-brown on the head, including the clypeus; the antennæ; the mandibles; the pronotum; the sides of the thorax; the propodeum; and the legs. A spot on the vertex around the ocelli and the terminal half of flagellum of the antennæ above, black. Ivory-yellow preapical, transverse, somewhat triangular spots in the lateral edges of tergites 1 to 4. Wings feebly infuscate, with purple effulgence in their apical half; subhyaline in their basal half, where the veins are yellowish; radial cell with a dusky spot. One or more of the lateral, yellowish spots of the abdomen may be absent; I have seen one female where they existed only on the second tergite. The base of the clypeus is sometimes yellowish-brown.

Length (h. + th. + t. 1 + 2), 10 to 11 mm.

♂.— Very similar to the female. The clypeus, a median frontal spot continuing between the antennæ to the base of the clypeus, the inferior margin of the emargination of the eyes, a stripe on the under side of the antennal scape, and the outer face of the mandibles, also pale yellow. Flagellum of the antennæ almost entirely black, their terminal hook ferruginous. The yellowish, lateral spots are sometimes also found on the sides of the fifth tergite and even in the apical lateral corners of sternites 2 to 4.

Length (h. + th. + t. 1 + 2), 7 to 8.5 mm.

Belgian Congo.— Boma, June 1915, 6 ♀♀ and 2 ♂♂ (Lang and Chapin Coll.). One of the females is the holotype.

61. **Odynerus (Rygchium) pseudolateralis** G. Meade Waldo

Belgian Congo.— Faradje, 1 ♀, January 1913 (Lang and Chapin Coll.).

In its color pattern this species is a good mimic of *O. lateralis* (Fabricius). G. Meade Waldo has pointed out its chief differences from that species. In fact, *O. pseudolateralis* comes much nearer *O. meyeri* Cameron, as regards structural characters, being also closely related to *O. dantici* (Rossi). The shape of the propodeum is almost exactly the same in *O. pseudolateralis* and *O. meyeri*, both species having the dorsal areas rugosely reticulate all over and separated from the postscutellum by a deep and broad fissure. The form and sculpture of the clypeus is hardly different and the punctation of the abdomen, too, is almost the same. I am unable to find any morphological difference between them, so that I am inclined to regard *O. pseudolateralis* as a very peculiar color variety of *O. meyeri*.

62. **Odynerus (Rygchium) meyeri** P. Cameron, var. **albolimbatus** A. v. Schulthess

This wasp is fairly common in the Lower Belgian Congo. I have seen 6 ♀♀ and 9 ♂♂ from Banana, September 1915, and 2 ♂♂ from Boma. I have also seen specimens from Lourenzo Marques (Entomol. Dept. of Cornell Univ.).

I do not know the typical *O. meyeri* P. Cameron. G. Meade Waldo[1] brings *O. meyeri* and its var. *albolimbatus* in the group of species without "fissure separating the median segment from the postscutellum"; this is undoubtedly a mistake. In both sexes there is a deep and broad notch nearly completely separating the dorsal areas of the propodeum from the postscutellum; the upper angles of the propodeum are rounded, but distinctly projecting; its lateral angles are also sharply marked. The shape of the propodeum is very similar to that of *O. dantici* (Rossi), but the clypeus is quite different in that species.

I have not seen specimens of *O. rhynchoides* Saussure, so that I cannot point out the real differences between this species and *O. meyeri*. I should not be surprised to find later that *meyeri*, *albolimbatus*, and *pseudolateralis* — and probably some other so-called species — are nothing more than color variations of *O. rhynchoides*.

63. **Odynerus (Rygchium) tropicalis** H. de Saussure

This species is one of the most common in the Ethiopian region and is easy to recognize.

♂.— Head: Fig. 199. Clypeus slightly broader than long; its apex feebly, arcuately emarginate; the emargination apparently deeper through the presence of a preapical, depressed and discolored lamella. Posterior ocelli about as far from each other as from the inner margin of the eyes. No hairy depression on the vertex. Temples with a strongly raised margin; the vertex, however, not margined behind. Mandibles with four teeth along their inner margin and a pointed, feebly curved apex. Flagellum of the antennæ slightly swollen; its terminal hook (Fig. 202) small, short, unguiform, scarcely curved; its bluntly pointed apex reaching slightly beyond the base of the eleventh antennal joint; the tenth antennal joint without excavation beneath. Pronotum with a very slightly raised margin on its anterior border; its lateral angles distinctly projecting. Scutellum transverse; slightly swollen; pillow-like; with a narrow depressed median line; its lateral posterior angles more or less raised into a tubercle, a spine, or a sharp longitudinal carina; this offers a great deal of variation, the lateral tubercles being often scarcely visible. Postscutellum with strongly projecting, long, and sharp lateral spines; these spines are somewhat flattened from the sides and placed obliquely so as to form the lateral endings of a narrow transverse carina of the anterior part of the postscutellum. The postscutellum is nearly entirely vertical, forming a part of the concavity of the propodeum. Propodeum short; its lateral angles broadly rounded; its apical teeth above the valvula of the abdomen very strong, curved upward; no raised lateral and inferior ridges; the concavity of the propodeum, however, separated from the dorsal lateral area by a distinctly raised, but very fine, superior ridge. Legs slender, normal; the hind coxæ with a sharp tooth on their upper side; the basitarsus of the hind legs (Fig. 200) normal. The claws bifid at their apex and with a distinct third tooth on the middle beneath (Fig. 201).

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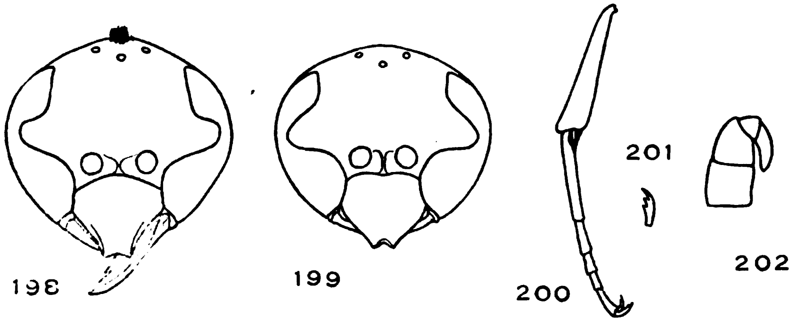
[1] Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 494.

Punctation uniformly dense and coarse all over, very coarse on front, mesonotum, scutellum and tegulæ; reticulately rugose on the sides of the propodeum; the punctation is finer, but very dense, on the second tergite; clypeus with numerous, coarse punctures; concavity of the propodeum very densely punctate, not shining. Second sternite somewhat flattened and feebly convex towards its base, where it is rather abruptly oblique, very coarsely punctate. Terminal sternites minutely punctate, the base of the fourth and fifth with a dense patch of long, decumbent, bright hairs. Wing venation similar to that of *O. kabarensis*.

Some specimens are colored almost like the female, but the clypeus is always entirely yellow. Very often, scutellum and postscutellum have each a transverse yellow band; as a rule, the fourth to sixth tergites show an apical yellow band. The ferruginous color may be much reduced, but even then the apical segments of the abdomen are partly reddish.



Figs. 198–202. *Odynerus tropicalis* Saussure.

Fig. 198. Head in front, ♀. Fig. 199. Head in front, ♂. Fig. 200. Hind tibia and tarsus, ♂. Fig. 201. Tarsal claw, ♂. Fig. 202. Terminal joints of the antenna, ♂.

Length (h. + th. + t. 1 + 2), 5 to 7 mm.

♀.— Very similar to the male. Head: Fig. 198. Clypeus nearly truncate at its apex or more or less arcuate; there is some variation as regards this, the Fig. 198 representing the most common type among the Congo specimens; there are two feeble, strongly diverging, longitudinal carinæ, starting from the outer edges of the apical truncature and completely disappearing below the middle of the clypeus. Vertex with two very small excavations, in front of which is a dense patch of long, erect hairs. Mandibles with four teeth along their inner margin and a sharp, scarcely curved apex. The lateral tubercles of the postscutellum are, as a rule, more distinct than in the male, sometimes carina-like. No hairy patches on the fourth and fifth abdominal sternites. Tarsal claws more deeply bifid at their apex, also with a third median tooth. Punctation as in the male; the clypeus with scattered, somewhat elongate punctures, giving it a substriate appearance.

Black, very extensively marked with ferruginous, both these colors intergrading. The ferruginous-red color covers the following parts: the clypeus except for a basal transverse yellow band; the mandibles; a transverse band on the front; the temples and the hind part of the vertex; the antennæ except for the upper face of the flagellum; the upper face of the pronotum; the tegulæ; a large spot on the mesonotum behind; a transverse band on scutellum and postscutellum; the major part of the propodeum and metapleura; three large spots on the mesopleura separated by the epimeral and episternal black sutures; the sternites of the abdomen nearly completely; two lateral spots on tergites one and two; the following tergites almost entirely; and the legs except for the yellow markings on femora and tibiæ and a few blackish dots on the tibiæ and tarsal joints. The ferruginous markings may be much less extensive, being then mostly replaced by black; especially the lateral spots on the second tergite may become very small or disappear. Very frequently there is a small, rounded, black dot in the center of the clypeus. In all the females I have seen, the three terminal abdominal segments are, at least partly, ferruginous.

The yellowish-white markings are as a rule restricted to a basal transverse band on the clypeus, a frontal spot above the insertion of the antennæ, the emarginations of the eyes, a small dot on the temples, a short transverse band in the middle of the pronotum, the posttegulæ, small lateral dots on the scutellum, an apical band on the first tergite and on tergite and sternite two, the outer side of the tibiæ, and a spot near the apex of the femora. In some specimens there are also yellow spots on the tegulæ and on the mesopleura beneath the wings, or there is an apical band on tergite three; very rarely one finds yellow lateral dots on the postscutellum. Many of these yellow markings can be more or less extensive; e. g., the yellow markings on the front and in the emargination of the eyes may fuse into a transverse, continuous band; or the dots on the scutellum may invade nearly the whole of its surface.

Length (h. + th. + t. 1 + 2), 6.5 to 8 mm.

Most of the females agree very well, as regards the coloration, with the original description and the figure of H. de Saussure.[1] The males have, as a rule, the ferruginous color less extended and the yellow markings more numerous.

Belgian Congo.— Numerous specimens from Malela, Boma, Coquilhatville, Stanleyville, Lubutu, Walikale, Lesse, Medje, Faradje, Aba, Akenge, and Garamba.

Mr. Lang collected several females in Faradje, October 1912, where they were drilling nesting holes into the brick walls of the houses.

Ethology. *Odynerus tropicalis* Saussure was thoroughly studied by Roubaud in the Dahomey.[2] This little wasp has a very remarkable life history: through its peculiar habit of feeding its larvæ from day to day with living, paralyzed caterpillars, it forms a type of its own, although it is probable that other tropical solitary wasps behave in a similar way. This species burrows in clay walls. Its galleries are small, 3 to 4 cm. long, 3 mm. in diameter; as a rule bifurcate, each of the branches containing one, rarely two cells; at the entrance of the gallery is built an elegant funnel of clay which is removed when the nest is closed. After oviposition, the mother wasp waits till the egg hatches or is ready to hatch and then brings the first provisions; but the supplying of food is always slow, the mother watching the growth of the larva and proportioning the prey to the size of her young. She closes the cell, without additional provisions, only when the larva is full-grown and ready to pupate. A further very interesting fact shown by this species is the tendency of the mother wasp to care for several larvæ at the same time: very often she starts a new burrow in the vicinity of the cell in which she is still nursing a larva; even before this larva is full-grown, she may lay an egg in this new cell and then for a time nurse two larvæ simultaneously. *Mesostenus tripartitus* Brullé is a parasite of this wasp.

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[1] Et. fam. Vesp., I, Eum., 1852, p. 214, Pl. XIX, fig. 5, ♀.

[2] Ann. Sc. nat. Zool., (10), I, fasc. 1, 1916, pp. 37–43.

The following two new species are closely related to *Odynerus sjöstedti* P. Cameron and it was believed at first that one of them was that species. They belong to the group of *O. silaos* Saussure in which the females are very similar, sometimes almost impossible to separate; the males present, as a rule, striking characteristics.

G. Meade Waldo[1] makes *O. yngvei* Cameron, ♂, the male of *O. sjöstedti* Cameron ♀; whereas A. v. Schulthess [2] considers both as distinct species and describes, furthermore, the true male of *O. sjöstedti;* the female of *O. yngvei* is apparently still unknown. I have followed A. v. Schulthess since this author gives the difference in the shape of the hind basitarsus as separating the two species in the male sex.

64. **Odynerus (Rygchium) kabarensis,** new species

♂.— Head (Fig. 204) normal; the posterior ocelli about as far from each other as from the inner margin of the eyes. Vertex without hairy fovea. Clypeus convex; about as broad as long; feebly, arcuately emarginate at its apex; with bluntly rounded lateral teeth; without carinæ. Mandibles moderately long; with four superficial teeth along their inner margin and a feebly curved apex. Temples and vertex behind margined by a fine raised carina. Antennæ with swollen flagellum; its terminal hook-like joint (Fig. 206) small, unguiform, feebly curved, its rather pointed apex not reaching the base of the tenth joint; third antennal joint one and one-half times as long as the fourth.

Thorax distinctly longer than wide. Pronotum without raised anterior margin; its lateral anterior angles feebly projecting. Epicnemia for the front and middle legs deeply depressed; those of the front legs margined in their inferior half by a feebly raised carina which runs over the mesosternum. Scutellum flat; transverse; with a very feebly raised tubercle on each side in its posterior angles. Postscutellum narrow; almost completely vertical; with two very feeble lateral spines, which are mere transverse tubercles, flattened from behind and slightly raised above the anterior margin of the postscutellum. Propodeum short; with a distinct concavity and rounded ridges; without lateral projecting angles. Legs long and slender; the femora feebly swollen; the hind coxæ with a sharply projecting tooth on their upper face. Basitarsus of the hind legs slightly curved on its outer side, with a projecting expansion before its middle on its inner side (Fig. 207). Claws of the tarsi (Fig. 208) almost simple; their apex scarcely bidenticulate. Wing venation: Fig. 205.

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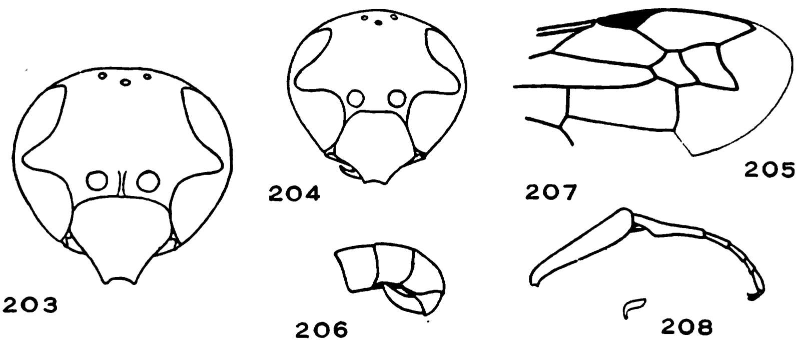
[1] Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53.

[2] Ark. f. Zool., VIII, No. 17, 1913, pp. 15 and 18.

Abdomen elongate. Its first segment slightly narrower than the second; cup-shaped; very gradually sloping towards its base. Second tergite distinctly swollen on its middle; with a feebly raised longitudinal ridge, which can easily escape notice; second sternite feebly raised, broadly rounded towards its short vertical, basal face.

Punctation nearly uniformly covering head, thorax, and abdomen. The posterior abdominal sternites, beginning with the third, present only a few minute punctures. The hind margins of tergites one and two are impunctate and slightly thickened. The punctation is much coarser on pronotum, tegulæ, mesonotum, and scutellum; much finer on the head, especially on the front. Concavity of the propodeum and posterior face of postscutellum shining, nearly impunctate; the sides and dorsal areas of the propodeum with scattered coarse punctures. Clypeus impunctate, nearly smooth.



Figs. 203–208. *Odynerus kabarensis*, new species.

Fig. 203. Head in front, ♀. Fig. 204. Head in front, ♂. Fig. 205. Venation of front wing, ♂. Fig. 206. Terminal joints of antenna, ♂. Fig. 207. Hind tibia and tarsus, ♂. Fig. 208. Tarsal claw, ♂.

Black. Clypeus, mandibles, a large spot between the antennæ on the front, the anterior half of the antennal scape, the emargination of the eyes, a spot in the upper part of the outer orbits, a transverse band on the pronotum much dilated on the sides, an ill-defined dot on the mesopleura under the base of the wings, the post-tegulæ, the tuberculate lateral spots on scutellum and postscutellum, apical bands on the first tergite and on tergites and sternites two to six (the band on the first tergite narrower than the others, those on tergites two to four slightly bisinuate in front), the outer margin of all the tibiæ, a small external dot near the apex of the femora, and the tarsi for the most part, yellowish-white. The apical joint of the tarsi darkened, but not quite black. The under side of the antennal flagellum and its terminal hook are ferruginous-yellow. Lateral hind angles of the pronotum, the tegulæ, the margins of the yellow mesopleural spot, broad lateral spots on the propodeum, lateral spots on tergites 1 and 2 (those on the first tergite extending towards the posterior margin), the legs except for the yellow markings, ferruginous-red. Wings nearly hyaline; with black veins and stigma, and a black spot on their anterior margin near their apex.

Length (h. + th. + t. 1 + 2), 6 mm.

♀.— Very similar to the male. The feeble longitudinal carina on tergite two and the lateral flattened spines of the postscutellum are somewhat more developed than in the male. Clypeus (Fig. 203) broader than long; its apex very feebly sinuate, nearly truncate, with bluntly rounded edges; its surface with a very few scattered punctures. Basitarsus of the hind legs without expansion. The claws of the tarsi are deeply bifid at their apex.

Clypeus whitish-yellow, except for the ferruginous apex; the under side of the antennal scape more ferruginous.

Length (h. + th. + t. 1 + 2), 6.5 mm.

Belgian Congo.— A pair from the shores of Lake Albert Edward, August 1914: the ♂ (holotype) at Kabare (southern shore of the lake), the ♀ (allotype) at Kasindi (northern shore) (J. Bequaert Coll.).

65. **Odynerus (Rygchium) chapini,** new species

Apart from the coloration, which is black and yellow without ferruginous, this species is very similar to *O. kabarensis.* It will be sufficient to point out the differences.

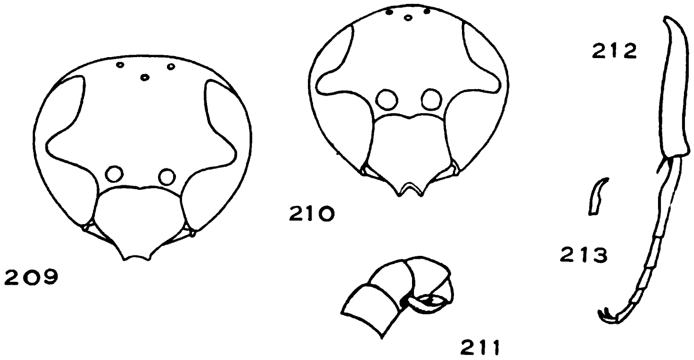
♂.— Head: Fig. 210. Vertex without hairy fovea. Clypeus about as broad as long; its apex deeply and arcuately emarginate, with projecting lateral edges; the emargination appears deeper than it really is, for the clypeus ends in a broad translucid margin. Terminal hook-like joint of the antennæ (Fig. 211) short; thick; distinctly curved and feebly twisted; flattened on its under side; scarcely reaching the base of the tenth joint. Lateral angles of the pronotum distinctly projecting. Scutellum without lateral tubercles. Lateral spines of the postscutellum much stronger and sharper than in *O. kabarensis;* however, also flattened from behind. Second abdominal tergite with scarcely any trace of a median longitudinal ridge. Basitarsus of the hind legs feebly, although distinctly, expanded on its inner side (Fig. 212). Claws (Fig. 213) scarcely bifid at their apex. Wing venation as in *O. kabarensis.*

The punctation is strong and coarse over the whole body, much stronger than in *O. kabarensis;* this is especially noticeable in comparing the sculpture of the front and second abdominal tergite. The clypeus also is very distinctly punctate. The last abdominal sternites are nearly impunctate and have no long fringes of hairs. The smooth apical margin of tergite 2 is scarcely thickened.

Black, with the following yellowish-white markings: the mandibles for the major part; the clypeus; a triangular spot between the insertion of the antennæ; the emargination of the eyes; an elongate dot on the upper part of the temples; the under side of the antennal scape; a narrowly interrupted transverse band on the anterior margin of the pronotum; the tegulæ except for a median black spot; the posttegulæ; a minute spot on each side of scutellum and postscutellum; a large spot on the mesopleura beneath the insertion of the wings; apical bands on tergites one to six and on sternite two, those on tergites 1 and 2 broader and somewhat widened on the sides; and the legs with the exception of the coxæ and basal half of the femora. The apex of mandibles, the under side of the flagellum, and the tarsi, more or less ferruginous; the terminal joint of the hind tarsi dark brown, not quite black. Wings hyaline; feebly darkened towards their anterior margin; with a bluish smoky spot near their apex.

Length (h. + th. + t. 1 + 2), 6.5 mm.

♀.— Very similar to the male; the clypeus (Fig. 209) not so deeply emarginate, with less projecting lateral teeth. The second abdominal tergite with a feeble, although distinct, longitudinal, raised ridge. Basitarsus of the hind legs without expansion. Tarsal claws deeply bifid at their apex. Punctation coarse, as in the male, especially on the clypeus where the punctures become elongate and give to the surface a rugosely substriate appearance. The color markings are much the same as in the male; the clypeus is black with a broad basal yellow band, and in one specimen also with two preapical spots.



Figs. 209–213. *Odynerus chapini*, new species.

Fig. 209. Head in front, ♀. Fig. 210. Head in front, ♂. Fig. 211. Terminal joints of antenna, ♂. Fig. 212. Hind tibia and tarsus, ♂. Fig. 213. Tarsal claw, ♂.

Length (h. + th. + t. 1 + 2), 6.5 to 7 mm.

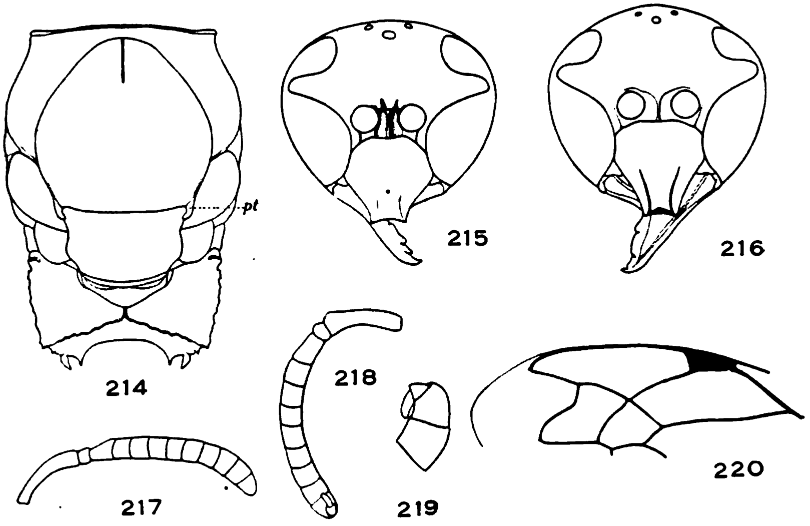
Belgian Congo.— Stanleyville, February to April 1915, 4 ♂♂ and 5 ♀♀ (Lang and Chapin Coll.). One of the ♂♂ is the holotype.

O. kabarensis and *O. chapini* may be easily separated in the male sex by the characters given in the descriptions. The females of these two species are much more similar: apart from the coloration, which may be variable, the punctation is very different, especially on the clypeus and front.

As far as the male is concerned, *O. sjöstedti* seems to be intermediate, in the shape of the hind basitarsus, between *O. chapini* and *O. kabarensis*, the expansion being stronger than in *O. chapini*. The published descriptions of *O. sjöstedti* do not permit a further comparative study of these three species.

66. **Odynerus (Rygchium) histrionimimus,** new species

♀.— Head (Fig. 216) subcircular; slightly broader than the thorax. Clypeus about as broad as long; piriform; its surface strongly convex in its upper half; flattened in its terminal part. The apical margin of the clypeus broad, nearly straight or faintly sinuate, measuring at least one-third of the total width of the clypeus, with broadly rounded and feebly projecting lateral edges. From each of these edges starts a curved, strong, longitudinal carina, which runs about to the middle of the clypeus. Vertex well developed, long, feebly convex, with two confluent, hairy foveæ on its middle; the posterior ocelli distinctly more remote from the inner margin of the eyes than from each other and nearly twice as far from the hind margin of the vertex. Front with a short, but sharp, median carina above the clypeus. Temples very sharply margined behind, the carina becoming obsolete or disappearing in the upper part of the head, behind the vertex. Mouth parts: labial palpi 4-jointed, their basal joint comparatively long and slender, their fourth joint well developed; maxillary palpi 6-jointed, their four terminal joints successively shorter, their two terminal ones almost subequal. Mandibles robust, moderately long, beak-like, shorter than the great ocular diameter, with irregular notches along their inner margin. Antennæ (Fig. 217) short; their flagellum distinctly swollen, not twice as long as their scape; the third antennal joint only a little longer than the fourth; joints 4 to 11 as broad as or broader than long.



Figs. 214–220. *Odynerus histrionimimus,* new species.

Fig. 214. Thorax from above, ♀: *pt*, posttegula. Fig. 215. Head in front, ♂. Fig. 216. Head in front, ♀. Fig. 217. Antenna, ♀. Fig. 218. Antenna, ♂. Fig. 219. Terminal joints of antenna, ♂. Fig. 220. Venation of front wing, ♀.

Thorax (Fig. 214) elongate; excluding the propodeum, longer than broad, as seen from above. Pronotum with a straight anterior margin, which is provided with a strong raised carina; this carina becomes lamelliform on the blunt, feebly projecting, lateral angles of the pronotum and continues beneath on the sides. Mesonotum and scutellum flat, without grooves or carinæ; the anterior half of the mesonotum with a feeble median depressed line. Postscutellum short, transversely triangular, on the same level as the scutellum, and entirely horizontal; it presents in its anterior part a slight transverse ridge, which is feebly crenulate and slightly depressed on its middle line. Propodeum comparatively elongate, especially on its sides; with a median horizontal area behind the postscutellum; the dorsal areas meeting there in a feeble longitudinal groove. The posterior concavity of the propodeum is very deep and well marked; its lateral, superior, and inferior ridges, as well as its lateral angles, being very strongly marked; on each side of the insertion of the abdomen the inferior margin of the propodeum ends in a curved tooth preceded by a series of 3 or 4 irregular spines. Mesopleura with distinct sutures separating the epimera and dividing the episterna in an upper and an under part; a very strong, sinuate, vertical carina borders, on the anterior part of the mesopleura, the epicnemia of the front legs; this carina disappears gradually towards the middle of the mesosternum; there is also an indication of a ridge in the posterior part of the mesopleura, in front of the epicnemia of the middle legs.

Legs, especially those of the front pair, comparatively short and thick, normal; the middle tibiæ with one apical spur; the tarsal claws bifid. Coxæ of the hind legs without tooth on their upper face. Wing venation of the *Odynerus* type (Fig. 220); but the second cubital cell strongly triangular in shape, its margin on the radius very short or absent; the two first intercubital nervures meeting on the radius; the second cubital cell sometimes even subpetiolate.

Abdomen elongate. Its first segment long, broadly convex at its base, nearly hemispherical; its swollen, basal part filling the concavity of the propodeum when the abdomen is bent upward. Second segment distinctly broader than the first, but without constriction at its base; the second and third tergite ending in a narrow, feebly raised lamella. Second sternite feebly and gradually depressed in its basal half on its middle; its basal, constricted neck with a row of fine, longitudinal rimples.

Punctation very coarse, dense and uniform on head and thorax, almost reticulately rugose. Clypeus with scattered strong punctures in its upper convex part and with irregular longitudinal striæ in its depressed portion between the carinæ. Tegulæ impunctate. Concavity of the propodeum without strong sculpture, very minutely, transversely striate; its dorsal lateral areas very coarsely and rugosely reticulate, with a distinct smooth space in its anterior lateral angle, above the stigmata. Punctation of the abdomen much finer than on the thorax and more remote; rather indistinct on its first tergite; more uniformly distributed on the following segments; the punctures on the depressed, median part of the second sternite stronger, but not so close.

Body covered with a grayish bloom and a few short, white hairs; the vertex and front with a denser, brownish pile.

Black, with the following ferruginous-red markings: the clypeus; the mandibles; the scape of the antennæ; the pronotum; the tegulæ; the postscutellum; the propodeum; the legs; the base and sides of the first tergite and the whole of its sternite; and often also a small spot on the sides of the second tergite near its base. Front wings hyaline from their base to the origin of the basal nervure, the remaining being dark brown with a bright purplish effulgence; in the hind wings the basal half is hyaline, the apical half purplish-brown.

Length (h. + th. + t. 1 + 2), 10.5 to 11.5 mm.

♂.— Agrees with the female in almost every respect, including coloration. The clypeus (Fig. 215) is ferruginous-red, not yellow, and densely clothed with short, silvery hairs; it has almost the same shape as in the female, but the longitudinal carinæ are very short and its surface presents no strong sculpture, the punctation being microscopical and hidden beneath the dense, silvery cloth of pile. No hairy fovea on the vertex. Antennæ (Fig. 218) short and thick; their apical hook-like joint (Fig. 219) very small, digitiform, straight, gradually tapering towards its blunt apex, which reaches the base of the eleventh joint. Legs normal.

Length (h. + th. + t. 1 + 2), 9 to 11 mm.

Belgian Congo.— Banana, August 1915, 18 ♀ ♀ and 9 ♂♂ (Lang and Chapin Coll.). The holotype is a ♀. The species is apparently one of the most common wasps at the mouth of the River Congo; it is surprising that it was not found in any other locality.

This wasp comes in the division *Stenodynerus* of the subgenus *Rygchium*, owing to the presence of a well-marked horizontal area formed by the propodeum behind the postscutellum. Among other African *Stenodynerus*, it comes apparently near *O. corvus* G. Meade Waldo, but the shape of the clypeus in that species is very different.[1]

The coloration of *O. histrionimimus* is almost exactly that of *Odynerus* (*Rygchium*) *histrionicus* (Gerstæcker), of which I have seen numerous specimens from Delagoa Bay in the collection of Cornell University. But *O. histrionicus* can be recognized at once by the shape of the postscutellum which forms the anterior margin of the concavity of the propodeum (the propodeum having no horizontal median area), by its impunctate abdomen, by the different shape of the clypeus which is ivory-white in the male, etc.

67. **Odynerus (Rygchium) rhizophorarum,** new species

♂.— Head: Fig. 222. Clypeus much broader than long; feebly convex; with a very broad, straightly truncate apex, which has more than one-third of the total width of the clypeus; edges of its apical margin acute, distinctly projecting. Vertex normal, without fovea, not margined behind; the posterior ocelli about as far from each other as from the inner margin of the eyes, much more remote from the hind margin of the vertex. Temples moderately strong, sharply margined behind. Mandibles comparatively short and broad; distinctly shorter than the great ocular diameter; with three strong teeth along their inner margin. Antennæ (Fig. 224) short; their flagellum distinctly swollen, most of its joints slightly broader than long; their third joint only slightly longer than the fourth. The two terminal joints very small, partly concealed in a large and deep groove on the under side of the eleventh joint; the hook-like joint (Fig. 225) small, short, straight and narrow, reaching the base of the eleventh joint.

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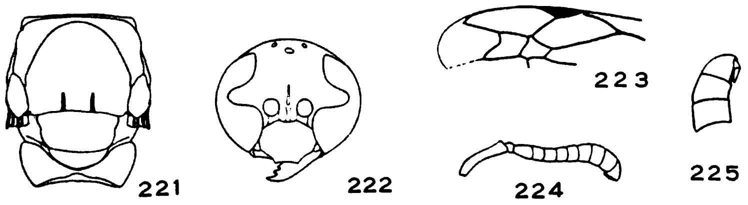
[1] Compare the figure given by G. Meade Waldo, Trans. Entom. Soc. London, (1914), pt. 3–4, 1915, Pl. xci, fig. 15, ♀.

Thorax (Fig. 221) short, quadrate, only slightly longer than broad. Anterior margin of the pronotum very broad, straightly truncate, with a strong and sharp raised carina, which projects in distinct angles on the sides. The pronotum not wider at the tegulæ than on its anterior margin. Scutellum flat, broad, and long, without carinæ or teeth. Postscutellum transverse; rounded behind; without protuberances or teeth; its anterior part raised into a broadly rounded, smooth, transverse pillow; its posterior part feebly sloping. Mesonotum with deep parapsidal furrows behind. Mesopleura with a very strong, somewhat sinuate carina bordering the epicnemia of the front legs; their posterior part also somewhat raised into a margin for the epicnemia of the middle legs. Propodeum moderately developed; its dorsal areas meeting on the middle line behind the postscutellum so that they form a short, although very distinct, horizontal median area, which, however, is depressed into a saddle and is separated from the postscutellum by a deep and narrow furrow. Concavity of the propodeum shallow and broad, distinctly margined on its upper part by the raised superior ridges; lateral and inferior ridges and lateral angles of the propodeum broadly rounded, the lateral angles scarcely marked. Legs normal; the hind coxæ with a sharp tooth on their upper face; the claws distinctly bifid before their apex. Wing venation: Fig. 223.



Figs. 221–225. ***Odynerus rhizophorarum*, new species.**

Fig. 221. Thorax from above, ♂. Fig. 222. Head in front, ♂. Fig. 223. Venation of front wing, ♂. Fig. 224. Antenna, ♂. Fig. 225. Terminal joints of antenna, ♂.

Abdomen elongate; the first segment short, with a rather vertical, abruptly rounded, anterior face; second segment about as long as broad, its sternite gradually sloping towards its base, not depressed on its middle.

Punctation dense and coarse on head and thorax; the clypeus also covered with numerous, large, but shallow punctures; the mesopleura and dorsal areas of the propodeum very rugosely reticulate; the punctures are still strong, but more remote on the mesonotum and especially on the scutellum, which has very few punctures on its middle. Concavity of the propodeum with coarse punctures on its upper part, nearly impunctate below. Tegulæ and anterior part of the postscutellum smooth, impunctate. Punctation of the abdomen much finer; on its dorsal face only distinct on the posterior half of the tergites; stronger and denser on the second sternite.

Black; with the under side of flagellum, tegulæ, extreme base of the abdomen, base of the apical abdominal segments, under side of the tibiæ, and terminal joints of the tarsi, more or less ferruginous. The clypeus, a spot in the middle of the front and in the bottom of the emargination of the eyes, the under side of the antennal scape, the larger part of the outer side of the mandibles, two transverse spots on the anterior margin of the pronotum forming an interrupted band, the pillow-like anterior part of the postscutellum, narrow apical margins of tergites 1 and 2 and of sternite 2, the coxæ nearly completely, and the outer side of femora and tibiæ, pale yellow. Wings subhyaline, with a dark purplish spot near their apical anterior margin.

Length (h. + th. + t. 1 + 2), 6.5 mm.

♀ unknown.

Belgian Congo.— Malela, 1 ♀, July 3, 1915 (J. Bequaert Coll.).

This species comes in the division *Stenodynerus* H. de Saussure of the subgenus *Rygchium*, and is apparently allied to *O. angustus* Saussure from Abyssinia.

Pterochilus Klug

The characters of this genus may be seen from the key, p. 27. It differs from *Odynerus* only in the remarkable structure in the female of the labial palpi, the joints of which are very elongate, flattened, and beautifully ciliated with long, recurved hairs on their inner side. This is more or less distinct in the female and always much less marked in the male; in fact, in many cases the labial palpi of the latter sex are of normal shape and not fringed. This difference between the two sexes was pointed out long ago by F. Morawitz[1]; yet several authors have made use of it to introduce new generic names, such as *Pseudopterocheilus* R. C. L. Perkins[2] and *Hemipterochilus* Ferton.[3]

In the very few species of which the males are known to me, the antennæ of that sex are shaped as in the subgenus *Odynerus, sensu stricto,* (= *Oplopus* Wesmael, *Oplomerus* Westwood) of *Odynerus* Latreille, the five apical joints of the flagellum being curled up. In fact, it is quite possible that some of the Ethiopian species referred to *Odynerus, sensu stricto,* belong really to *Pterochilus.*

About 76 species have been described from the Palearctic, Ethiopian, Oriental, Australian, and Nearctic regions. In Africa they are almost restricted to the northern and southern subtropical parts.

The only exception to this is *Pterochilus versicolor* A. v. Schulthess, which was described from Bunkeya and Lukafu,[4] in the southeastern Belgian Congo (Katanga). I have not seen that species. The female alone is known. In comparing v. Schulthess' description of this wasp, with that of *Odynerus*

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[1] Hor. Soc. ent. Rossicæ, IV, 1866, p. 110.

[2] Ent. Monthly Mag., XXXVII, 1901, p. 266.

[3] Ann. Soc. entom. France, LXXVIII, (1909), fasc. 3, 1910, p. 419.

[4] Societas entomologica, XXIX, 1914, p. 78.

adonis G. Meade Waldo (p. 124), from the same region, I came to the conclusion that both are based on the same species. If this proves to be true after a comparative study of the types, A. v. Schulthess' name will have the priority.

Ethology. Very little is known in regard to the life history of *Pterochilus*, since apparently only two species have been studied in this respect. According to A. v. Schulthess,[1] the common European *P. phaleratus* (Panzer) nests in sandy soil, forming colonies. The habits of its variety *chevrieranus* (Saussure) have been observed in Southern France by Ferton.[2] The female burrows in hard sandy or clayey soil, making a vertical gallery about one centimeter in length, which ends in a horizontal cell. A few paralyzed caterpillars are stored in this cell; and the egg hangs on a short thread from the ceiling. The adult larva spins a white, soft, and transparent cocoon before pupating. There is no chimney at the entrance to the nest. The habits of this species are very similar to those of the majority of the species of *Odynerus*. C. Horne and F. Smith[3] describe the nesting habits of the Indian *P. pulchellus* Smith as follows: "This little insect builds its parallel galleries on the nearly smooth surface of whitewashed and other walls. The cells are above one another, lined with a gummy substance and fine silk (?). The clay must necessarily, from the size of the insect, be very finely worked; and the food stored consists of very minute spiders. I have reason to believe that it sometimes builds its cells on hanging straws under shelter; but the example figured was found in my veranda, built on the walls or pillars, and attached to the plaster." It seems to me that Horne's observations on this Indian wasp need verification. The nest described by Horne and Smith resembles strangely certain nests of *Pison*, stored with spiders, which I observed in the Belgian Congo.

Synagris Latreille

This genus is peculiar to the Ethiopian region, of which it is one of the most striking insect forms. The species are numerous; most of them are of large size and brilliantly colored; and, furthermore, they are of very common occurrence; their habits, also, contribute to bring them among the small number of insects which attract the attention of even the most superficial traveller.

Figure 226 shows the range of the genus: it seems to be restricted to the continental part of Africa; it has never been recorded from Southern Arabia nor from Sokotra, and it seems to be absent from the Malagassy subregion. There are a few records from Madagascar[1] but I doubt their correctness. The genus is very abundant, both in species and in individuals, near the equator; its importance decreases towards the tropics. In the northern part, it has been repeatedly observed near the Senegal and the Gambia, in Northern Nigeria, in Eritrea, and the Oriental Sudan (Suakim); but it seems not to have reached Egypt proper. In South Africa, it is still very common in Natal and Transvaal; there are also definite records from the Orange River Colony and the eastern Cape Colony (as far as Port Elizabeth); its most southern localities in Damaraland are Windhoek and Rehoboth, and it was not found there beyond 24° S. lat. There are, it is true, some

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[1] Fauna Insectorum Helvetiæ. Hymenoptera. Fam. Diploptera, 1887, p. 120.

[2] Ann. Soc. entom. France, LXXVIII, (1909), fasc. 3, 1910, pp. 419–420.

[3] Trans. Zool. Soc. London, VII, pt. 3, 1870, p. 168, Pl. xxi, figs. 8, 8a, and 8b.

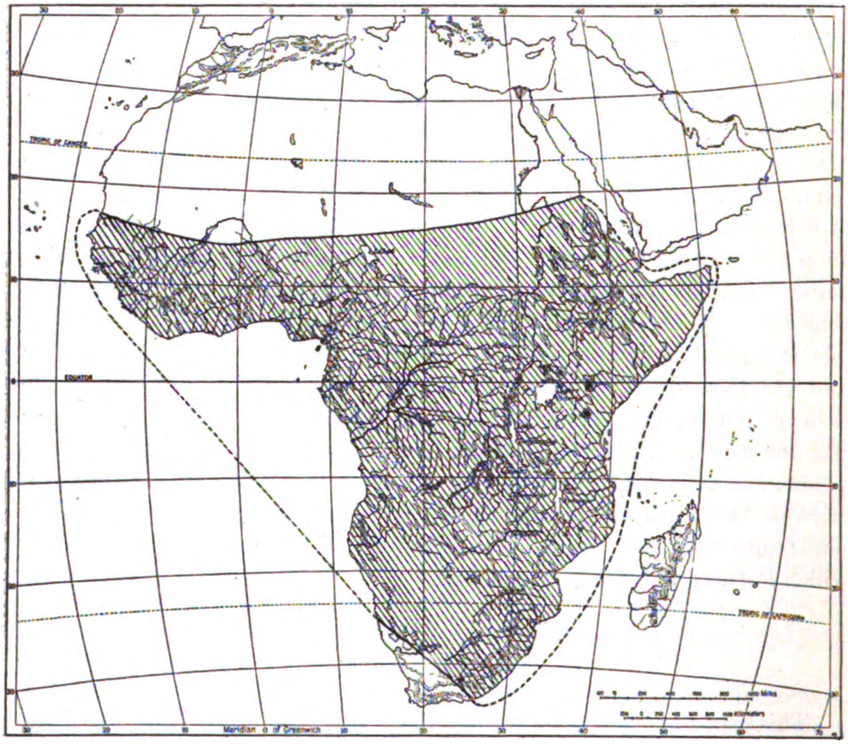

Fig. 226. Distribution of the genus *Synagris*.

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[1] Maidl records *S. analis* Saussure and *S. abyssinica* var. *emarginata* Saussure from "Rumena Val" (Madagascar) after three females belonging to the Brussels' Museum.

specimens in various collections labelled "Cape" or "Cape of Good Hope," but this can mean any part of the Cape Colony and is not a proof of the occurrence of any *Synagris* near Cape Town or in the district of Port Nolloth. This genus has also been found on the following African coastal islands: Bissago, Fernando Po, and Zanzibar.

I have discussed at length the distribution of this genus because it offers a good illustration of a large group, typical of the African continent and restricted to the Ethiopian region of the botanists, which it covers almost exactly (compare with the map, p. 19.) I believe that, were the distribution of the different species of *Synagris* more completely known, some of them would prove to be confined either to the Savannah province or to the Western forest province of the botanists, but the available data are insufficient to reach yet definite conclusions with regard to this point.

The genus *Synagris* includes large or medium-sized insects of a typical wasp-like appearance. However, similarly shaped species are also found in *Odynerus*, especially among the forms which were formerly separated into a distinct genus *Rhynchium*.[1] The distinction between *Synagris* and *Odynerus* is often difficult, as is proved by the fact that even experienced hymenopterists have described species of *Odynerus* as *Synagris*. The only characters on which one can rely to properly recognize a *Synagris* are found in the mouth parts and it cannot be repeated too often that an examination of the buccal organs must always precede the identification of any specimen belonging in this group.

The mouth parts of *Synagris* have been described by H. de Saussure[2] and recently more in detail by F. Maidl.[3] Figs. 227 to 229 illustrate their structure in the type species, *S. cornuta* (Linné). All their parts are much elongate. The mentum is long and comparatively narrow; the ligula is very elongate, deeply bifid (for about its apical half), its terminal two pieces densely hairy; paraglossæ very long and slender, reaching the apical branches of the ligula; in this species there are no distinct horny spots at the apices of the branches of the ligula and of the paraglossæ. Labial palpi *three-jointed*, the joints very narrow; the basal joint much the longest; the third joint ends in a long, curved, and thickened bristle, which might be considered as a modification of a fourth joint, were it not for the fact that in other species of the genus one finds at this place two or more such bristles.[4]

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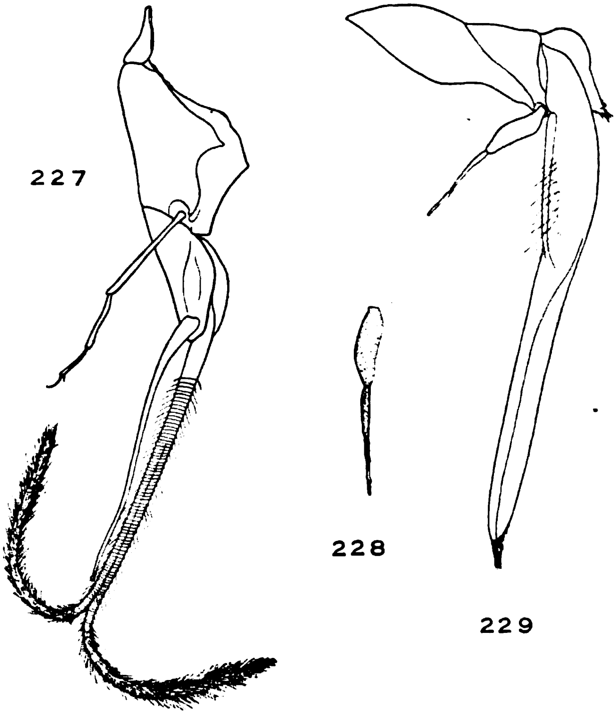
[1] I have explained before how *Rygchium* Spinola (= *Rhynchium* auct.) is merely an artificial group of large-sized *Odynerus;* in this paper *Rygchium* is used as a subgeneric name for those species of *Odynerus* which have been known thus far as *Leionotus* (p. 121).

[2] Etudes fam. Vesp., I, Eum., 1852, p. 77, Pl. v, fig. 2.

[3] Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 223–225.

[4] In many species of *Odynerus*, moreover, there are one or more such strong, curved bristles at the apex of the third joint of the labial palpi, next to the true fourth palpal joint.

Maxillæ very long, sheet-like, when fully extended reaching beyond the apices of the mandibles, although the latter form a very elongate beak; the lacinia much longer than the stipes and with a dense hair brush at their apex. Maxillary palpi normally 5-jointed, although in most of the adult specimens there are only three joints left; the basal joint is very broad and flattened, the following joints are much narrower, though still distinctly flattened; they are successively shorter towards the apical one.



Figs. 227–229. Mouth parts of *Synagris cornuta* (Linné), ♀.

Fig. 227. Labium and labial palpus. Fig. 228. Maxillary palpus prepared from a pupa. Fig. 229. Maxilla and maxillary palpus.

The mouth parts of the other species of the genus are more or less differently built, but in all of them the *labial palpi are three-jointed* and, with a single exception, the *maxillary palpi have no more than five joints* (*S. vicaria* Stadelmann has 6-jointed maxillary palpi).

Until recently, there has been much discussion as to the true number of joints in the maxillary palpi of *Synagris*. It is well known that H. de

Saussure believed this number to be variable within the limits of the genus, although constant for each species; on this difference the celebrated author divided the genus into groups of subgeneric rank characterized by the maxillary palpi being either three-, four-, or five-jointed. However, he seems to have had some suspicions as to the value of this character, since he writes: "La petitesse du 4^e^ article chez les espèces qui en possèdent plus de 3 et l'extrême ressemblance des 3 premiers avec les 3 articles des espèces qui n'en possèdent que 3, fait que l'on se demande si le 4^e^ article n'est pas sujet à tomber durant la vie de l'insecte, et si la division *Antagris* ne serait pas seulement basée sur des individus mutilés, ayant perdu leur 4^e^ article maxillaire." The chief reason why he rejected this supposition was that in certain species, which are very distinct by other characters (such as *S. cornuta*), he was unable to find a specimen presenting more than 3 palpal joints: "J'en dois conclure que c'est bien là l'état normal de ces espèces et point un état résultant de la chute naturelle ou accidentelle d'un 4^e^ article."[1]

Maidl[2] has recognized that the number of joints of the maxillary palpi affords only in a few cases reliable specific characters and, as a conclusion, he has made very important and fortunate changes in the taxonomy of the group. Not only has he united a large number of species which were merely separated on account of a difference in the number of palpal joints, reducing considerably the number of real specific forms and throwing at once a flood of light on their true affinities; but he has furthermore altered completely the subgenera of de Saussure, which were to a great extent based on differences in the number of joints of the maxillary palpi.

Before I had any knowledge of Maidl's observations, I had reached a similar conclusion by a very different method. Since it seems to me that there are still some points open to discussion, I think it worth while to record the facts on which I base my personal opinion.

Mr. Lang collected at Medje a nest of *S. cornuta* var. *flavofasciata* and had the happy idea of preserving in alcohol, together with the mother wasp, the individuals in different developmental stages found in each of the cells. Both maxillæ of the mother wasp presented three-jointed palpi. From one of the cells was removed a nearly completely developed pupa, which was fully colored, the yellow transverse band on the first tergite, characteristic of the variety, being just as conspicuous on the black abdomen as in the adult specimens. However, the wings, legs, and mouth parts were still enclosed in their nymphal sheets. I carefully removed the sheets of the maxillary palpi and discovered that in this stage these organs are distinctly five-jointed (Fig. 228); this was visible on both maxillæ. Furthermore, only the three basal joints were brownish and chitinized, the two apical ones being whitish and soft. In another vial in which Mr. Lang had preserved the contents of another nest together with the mother wasp, I found a completely developed female ready to emerge: its right maxilla showed five-jointed palpi, whereas only three joints were visible on the left side. In this case, the maxillary palpi of the mother wasp were three-jointed on one side and only two-jointed on the other. This result brought me to look over carefully the mouth parts of a large set of *S. cornuta* (130 specimens belonging to the typical form and to the different varieties), but I have found three-jointed maxillary palpi in all the specimens, except in one female where they were five-jointed on both sides; this specimen belonged to the typical *S. cornuta* and was caught with numerous others (with three-jointed palpi) from a large colony; it must be added that it was preserved in alcohol. Thus, *S. cornuta* possesses five-jointed maxillary palpi, but as a rule the two apical joints are dropped either together with the nymphal sheets or shortly after the insect emerges.

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[1] Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 174.

[2] Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 223.

Similar observations on other species are much needed, but they will prove, I believe, that in all species of *Synagris* (with the exception of *S. vicaria* Stadelmann) the normal number of joints in the maxillary palpi is *five*, there being only a difference in the number which happens to be retained by the emerged adult. F. Maidl still believes that certain species have normally 4-jointed maxillary palpi, though he admits that it is difficult to decide whether one of the joints dropped off or not. I think that the examination of the pupæ of various species will easily solve the problem. So much is sure: the number of joints of the maxillary palpi can no longer be used to separate the species.

Very little is apparently known as to the function of the palpi in the Hymenoptera, but from the state of affairs observed in *Synagris* we may reasonably infer that in this genus their function can not be very important. The number and the shape of the palpal joints have been extensively used throughout the order as generic characters, but I believe that in many cases their importance has been over-estimated.

Numerous *Synagris* have been described as distinct species, as is amply proved by the long list of synonyms in the second part of this paper; several species were also wrongly included in the genus. All this made the identification of these interesting wasps extremely difficult. It is therefore very gratifying that Maidl has recently published a Monograph of the genus,[1] which, as a whole, proves to be a valuable revision of the group. My own conclusions were largely reached before I had an opportunity of seeing a copy of Maidl's paper; but, as a rule, they agree with this author's views.

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[1] Monographie der Gattung Synagris Latreille. Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 215–333, Pls. I–V. I am much indebted to Mr. J. C. Nielsen of Copenhagen, for procuring for me, under the present difficult circumstances, a copy of Maidl's paper.

Maidl has given very complete information with regard to the characters which may be used to separate the species; he has plainly shown the great individual variability not only of the color pattern, but also of many morphological characters of the males, which have frequently been believed to be of specific value.

The sculpture of the propodeum is, in my opinion, one of the most useful characters of the genus, because it is similar in both sexes of the same species. It seems to me that Maidl has not laid enough stress on this peculiarity, although he describes the sculpture accurately for each species. The concavity of the propodeum is always transversely striate, but the striæ are stronger in certain species than in others. In some species, however, (such as *S. spiniventris* [Illiger] and *S. calida* [Linné]) the striation continues on the sides in the upper part, covering the entire dorsal lateral areas with conspicuous, regularly parallel, transverse wrinkles; whereas in others (such as *S. abyssinica* Guérin), the striation is indistinct on these dorsal areas and gradually becomes a system of irregularly reticulate ridges, the surface having a granulose appearance.

Ethology. No other genus of solitary wasps offers such an amount of interesting ethological problems. Some of the species are still true to the primitive habit of the Eumeninæ, hurriedly accumulating a provision of caterpillars above the egg, then walling the orifice of the cell, and taking no further care of their offspring. In other species, however, the maternal instinct is much more perfect; the female nurses her young from day to day, with caterpillars ground up into a paste; this is evidently a transition towards the feeding habits of the true social wasps. Intermediate conditions between these two extremes are also found.

The habits of the following species of *Synagris* have been studied more or less completely: *S. calida* (Linné), *S. clypeata* Mocsáry, *S. cornuta* (Linné) and its varieties, *S. mirabilis* Guérin, and *S. spiniventris* (Illiger); most of these observations are recorded below under the named species.

S. mirabilis Guérin was observed by Gueinzius in Natal. The mud nest described by Smith[1] was much smaller than that of *S. calida* and probably in an unfinished state; it contained only two cells.

In the second part of this paper I have listed 24 forms of *Synagris* which I believe to be distinct species, characterized by constant structural peculiarities. Of these, 11 are represented in the collection made by the Congo

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[1] F. Smith, Trans. Entom. Soc. London, (2), III, 1856, p. 128.

Expedition. I have not seen specimens of the following species, which have also been recorded from the Belgian Congo:[1]

S. aterrima Maidl.— Northeastern Belgian Congo (Moera, near Beni, type locality).[2]

S. negusi R. du Buysson.— Northwest of Lake Tanganyika.[3]

S. ornatissima Maidl.— Northeastern Belgian Congo (Mawambi, type locality).[4]

S. proserpina Gribodo var. *nyassæ* (Stadelmann).— Southeastern Belgian Congo (Lufira River, Katanga).[5]

S. similis Maidl and its var. *maculata* Maidl.— Northeastern Belgian Congo (Beni and Moera, type localities).[6]

S. vicaria Stadelmann.— Southeastern Belgian Congo (Lofoi, Katanga).[7]

The 18 species which are thus known to occur within the boundaries of the Belgian Congo can be separated by the following keys. These keys are only in part based on the one proposed in Maidl's Monograph, since I found it useful to include in them more of the structural characters of the species.

Key to the Subgenera of *Synagris*

1. ♀. Clypeus piriform, with two conspicuous longitudinal carinæ on its apical two-thirds. Mandibles comparatively short, strongly grooved and carinate on their external face, their inner margin only with three feeble notches. Postscutellum feebly raised, not gibbose. Propodeum without strong lateral spines, its lateral and inferior ridges irregularly denticulate. ♂ unknown. *Pseudagris*.

   ♀ ♂. Clypeus without carinæ or with a feeble indication of two very short ridges near its apex..2.

2. Maxillary palpi 6-jointed; labial palpi 3-jointed, but the joints very long and heavily built. Vertex without hairy fovea. Mandibles and postscutellum as in *Pseudagris*. Propodeum without strong lateral spines, not denticulate. In the ♂ the terminal joint of the antennæ is very short, hardly curved, and cannot be folded as a hook beneath the apex of the flagellum..*Rhynchagris*.

   Maxillary palpi never more than 5-jointed; labial palpi slender. Postscutellum bidentate or with two gibbosities. Propodeum as a rule with lateral acute protuberances. Terminal joint of the antennæ ♂, elongate, more or less curved, folded as a hook beneath the apex of the flagellum................3.

3. Mandibles with more or less distinct grooves and carinæ on their external face, their inner margin in the ♀ with three notches; in the ♂ with teeth of variable

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[1] According to personal observations made during 1912, *S. mirabilis* Guérin exists in the southeastern Belgian Congo (Katanga); but the specimens were not studied in preparing this paper.

[2] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 247.

[3] F. Maidl, *op. cit.*, p. 273.

[4] F. Maidl, *op. cit.*, p. 298.

[5] G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 454 (*S. flavomaculata* G. Meade Waldo).

[6] F. Maidl, *op. cit.*, p. 309.

[7] F. Maidl, *op. cit.*, p. 251.

size and shape, very rarely (*S. negusi*) with protuberances near their base. Postscutellum with lateral, somewhat spiny tubercles...........*Paragris.*
Mandibles almost smooth on their external face, their inner margin in both sexes finely serrulate; in the ♂ often with protuberances or horns near their base. Postscutellum with two gibbosities (not bispinose)....*Synagris, sensu stricto.*

These four subgenera are well-defined, natural groups, much better defined, indeed, than many of the "genera" which have been proposed in recent years among the Vespidæ.

Subgenus **Synagris,** *sensu stricto*

Maidl accepts four species in this subgenus: *S. cornuta* (Linné), *S. similis* Maidl, *S. proserpina* Gribodo, and *S. fulva* Mocsáry. All of these are very variable as regards color, so that it is important to know their true morphological characters.

S. fulva Mocsáry has not been found hitherto in the Belgian Congo; it is chiefly characterized in the male by the existence of a protuberance (of the shape of a spine or horn) on the base of the clypeus. The structural differences between the three other species are exceedingly feeble, at least according to Maidl's descriptions. They are compared in the following table:

cornuta	*proserpina*	*similis*
♀♀	♀♀	♀♀
Second abdominal sternite gradually sloping from the middle of its length towards its base.	Second abdominal sternite more suddenly sloping on its basal third.	Apparently like *S. cornuta*, the differences given have hardly any value.
	Tubercles of the postscutellum as a rule more prominent than in *S. cornuta*.	
♂♂	♂♂	♂♂
Second abdominal sternite gradually sloping from the middle of its length towards its base.	Second abdominal sternite more suddenly sloping on its basal third.	Second abdominal sternite and denticulation of the mandibles as in *S. cornuta*.
Apical margin of the clypeus narrowly or broadly rounded, or nearly truncate.	Apical margin of the clypeus distinctly truncate or more or less emarginate.	Apical margin of the clypeus distinctly emarginate.
Denticulation of the inner margin of the mandibles only slightly stronger at their base than at their apex.	Denticulation of the inner margin of the mandibles stronger than in *S. cornuta*, especially towards their base.	

I have not seen *S. proserpina* and it is possible that this is a distinct species. In the typical form (which has not been found in the Belgian Congo) the head, thorax, and base of the abdomen are entirely, or nearly entirely, brownish-red; the rest of the abdomen is black, with interrupted white bands on the apical margin of tergites 3 to 5.

The var. *nyassæ* (Stadelmann) has been recorded from the Katanga (Lufira River)[1]; it differs from the typical form in the extension of the black color on head, thorax, and base of the abdomen; the white bands on the terminal tergites are broadly interrupted on the middle line, so as to form lateral spots. Total length: ♀, 20 to 25 mm.; ♂, 25 to 30 mm.

Synagris similis Maidl and its variety *maculata* Maidl were described from 4 ♀♀ and 3 ♂♂ from the northeastern Congo Forest (Beni and Moera).[2] I do not believe that the structural characters given by the author are of any value in this group. I have seen several specimens of a *Synagris* collected near Beni (Lesse and vicinity), which are colored exactly like Maidl's *S. similis*, but I cannot discover any difference in the structure of either sex between them and *S. cornuta* (Linné). These specimens are described below as *S. cornuta* var. *similis*, new variety (p. 210).

S. similis Maidl is described as being almost entirely black, with the clypeus, mouth parts, antennæ, and legs more or less brownish-red. The var. *maculata* Maidl differs only in having two more or less extended, lateral, whitish-yellow spots on the second abdominal tergite. Total length: ♀, 20 to 24 mm.; ♂, 23 to 24 mm.

Synagris cornuta (Linné)

This species is one of the most common wasps throughout Equatorial Africa. Its coloration is very variable, but it can always be recognized by the following structural characters.

Mandibles straight, styletiform, long and very sharp; their inner, straight margin finely serrulate. Postscutellum raised on each side of the middle line in a broad, low, and bluntly rounded tubercle. Lateral angles of the propodeum strongly projecting as sharp teeth. Clypeus separated in both sexes from the inner margin of the eyes by distinct cheeks; in the ♀, the clypeus about as broad as long, with a rounded or even pointed, blunt apex; in the ♂, the shape of the clypeus is somewhat variable owing to differences in the development of the basal mandibular horns; very often it is distinctly broader than long and its apical margin is truncate and rounded.

Length (h. + th. + t. 1 + 2): ♀, 14 to 21 mm.; ♂, 18 to 28 mm. The size of the male is very variable, but as a rule this sex is larger than the female.

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[1] G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 454.

[2] F. Maidl. Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 309.

Among the characteristics of this species are the horn-like excrescences at the base of the mandibles in the male; both size and shape of these horns are very variable. In a specimen from Malela, these horns are 15 mm. long, i. e., scarcely shorter than head and thorax together; in this case, they are strongly curved inwardly and ventrally so as to cross each other on their apical third; about their middle they present on their dorsal face a strongly projecting tubercle, and a similar but slighter swelling near their base. In other specimens in which the horns are shorter, these median and basal tubercles disappear; one may find a complete series of transitions between such specimens with very long horns and individuals which may be called unarmed, since they present on the base of the mandibles only a broadly rounded tubercle. There is, apparently, some correlation between the size of the body and the length of the horn-like appendages, the largest males having as a rule the longest horns; furthermore, a correlation of a similar nature seems to exist between the length of the horns and the size of the head. The material at hand is not extensive enough to permit a statistical evaluation of the frequency of different developmental stages of these horns. In this species the male always has a distinct longitudinal groove on the vertex, and its second abdominal sternite is always unarmed.

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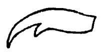

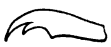

231

Fig. 230. *Synagris abyssinica* Saussure, tarsal claw, ♀.

Fig. 231. *Synagris cornuta* (Linné), tarsal claw, ♀.

An excellent specific character, which has apparently been overlooked, is the shape of the tarsal claws of both sexes; they are not only bifid at their apex, but between the preapical tooth and their base, their inferior margin is distinctly produced in a broad, triangular, accessory tooth, which I was unable to find in any other species of *Synagris* (Fig. 231). It will be interesting to inquire whether *S. proserpina* also possesses this accessory tooth.

I have given, in Fig. 232, an outline drawing of the male genitalia of *S. cornuta* as seen from above, merely to call attention to these organs, which may perhaps furnish reliable specific characters. It is very unfortunate that hymenopterists have so far failed to reach an understanding with regard to the nomenclature of the male genitalia. I would have liked to use Franklin's names, as explained in his paper on American Bombidæ[1]; but I found this impossible, partly because the homology of the different parts of the genitalia in the bees and wasps is not yet clear. In the absence of anything better, I have followed E. Zander,[2] who has given a comparative table of the different names used for the same parts by previous authors.

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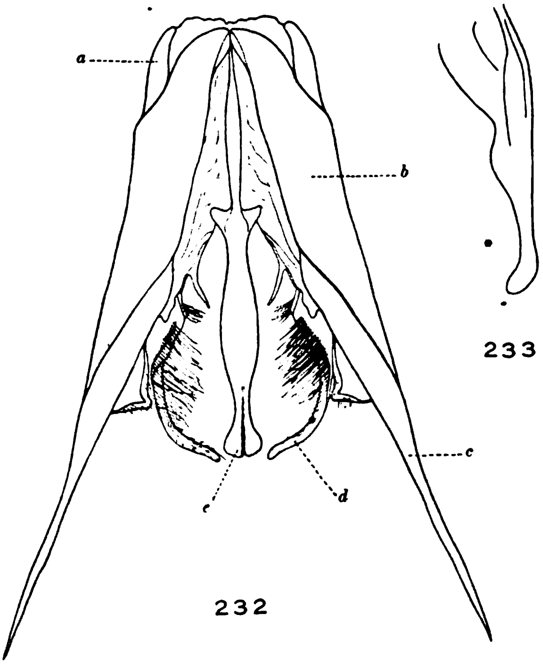
[1] Trans. Amer. Ent. Soc., XXXVIII, 1913, pp. 223–225.

[2] E. Zander, Beiträge zur Morphologie der männlichen Geschlechtsanhänge der Hymenopteren. Zeitschr. f. wiss. Zool. Leipzig, LXVII, 1900, pp. 461–489, Pl. xxvii.

The *cardo* (*a*) is a large dorsal, basal sclerite which provides most of the attachment for the genitalia to the rest of the abdomen; in *Synagris* it is distinctly subdivided, being only chitinous on its sides. On the cardo are inserted two lateral organs which may be known as the *claspers*, although they consist each of two fundamentally distinct parts: the *valvæ*. The *valva externa* (*b*) corresponds to Franklin's *branch* or *stipes;* it is comparatively short in this genus. The *valva interna* (*c* and *d*) is subdivided into a number of differently shaped pieces; the two most apparent of them are: an elongate and narrow, sharply pointed, chitinous, external piece, which may possibly correspond to Franklin's *squama* (*c*); and a membranous internal, hairy lobe, which may be Franklin's *volsella* (*d*). The valva interna has been called, in *Vespa germanica* by Kluge,[1] *sagitta,* a name which has



Figs. 232–233. *Synagris cornuta* (Linné).

Fig. 232. Genitalia, ♂, from above: *a*, cardo; *b*, valva externa; *c* and *d*, valva interna; *c*, squama; *d*, volsella; *e*, penis. Fig. 233. Penis, ♂, in profile.

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[1] M. Kluge, Das männliche Geschlechtsorgan von *Vespa germanica*. Arch. f. Naturgesch., LXI, 1, 1895, pp. 159–198, Pl. x.

been applied in *Bombus* to an entirely different organ. The shape of the valva externa is apparently the same in all species of *Synagris*, whereas the valva interna seems to afford good specific characters. Between the claspers we find on the middle line an unpaired organ, which is called by Zander the *penis* (*e*); in *Synagris* it is only very feebly divided at its apex. It corresponds to the sagittæ + uncus + penis of Franklin and to the *spatha* of Kluge. Its shape may also be used for systematic purposes.

The geographical distribution of *S. cornuta* (Linné) and its numerous color forms is very instructive: as known at the present time, it covers almost exactly Engler's Western Forest Province, the species being most abundant in the Rain Forest (compare with the map, p. 19); it extends from Sierra Leone, the Gold Coast, and Togo, throughout Cameroon, Spanish Guinea, the French Congo, the Portuguese Congo (Landana), and the Belgian Congo, as far east as Uganda and the eastern shores of Lake Victoria Nyanza. It seems not to exist in Angola proper nor in the southeastern Belgian Congo (Upper Katanga); in the latter region it is apparently replaced by the East African *S. proserpina* Gribodo.

Key to the Color Varieties of *S. cornuta* (Linné)

1. Abdomen entirely black or with the basal part of the first segment ferruginous-red. No yellow or yellowish-white markings on the second segment......2.
Second abdominal tergite with yellow or yellowish-white spots or bands....5.

2. The insect nearly entirely black; only the antennæ, clypeus, mandibles (with their horns in the ♂), and legs more or less ferruginous.
var. *similis*, new variety.
The ferruginous color much more extended, invading the thorax also........3.

3. Head, thorax, legs, and base of the first abdominal segment entirely or nearly entirely ferruginous-red........................var. *rufithorax*, new variety.
The vertex and at least a median mark on the mesonotum black............4.

4. Mesonotum entirely or nearly entirely black, this color also extending over the upper part of the temples......................typical *S. cornuta* (Linné).
Mesonotum only with a broad, elongate, median, black mark; the black on the head restricted to the vertex....................var. *ituriensis*, new variety.

5. Thorax entirely, legs and head for the greater part, black..................6.
Head, thorax, and legs for the greater part ferruginous-red; the vertex and mesonotum black...7.

6. Second abdominal tergite with two lateral, whitish-yellow spots.
var. *maculata*, new variety.
Second abdominal tergite with a continuous, transverse, whitish-yellow band.
var. *flavofasciata*, new variety.

7. Second abdominal tergite with two lateral, whitish-yellow spots.
var. *didieri* (R. du Buysson).
Second abdominal tergite with a continuous, transverse, whitish-yellow band.
var. *basalis* (Mocsáry).

As these different color varieties are shown on Plate II, it will be easy to recognize them. It must, however, be remembered that they are connected by intermediate color variations; and, since they occur together in the same region and often in the same colony of nests, they cannot be considered as subspecies or geographical races.

68. **Synagris cornuta** (Linné), typical form

Plate II, Figure 2

The typical form is the color variation originally described by Linné as *Vespa cornuta.* In this the abdomen is entirely black; head, thorax, and legs are for the most part ferruginous-red; the vertex, black; the mandibles, yellow; the mesonotum, black. Wings, very dark brown or black, with purple effulgence. I have not seen the quite typical coloration; what comes next to it among the Congo material are numerous specimens of both sexes which may be called subtypical; they agree with the typical form except for the ferruginous-red basal part of the first abdominal segment. This red base may be more or less extended, and may cover the whole of the sternite, but I have seen no specimens with entirely rufous first tergite. Very often also the pleura are more or less black. This color variation is apparently the most common form, at least in the West African subregion; it is the var. *a* of H. de Saussure[1] or var. 2 of Schletterer.[2] It is hardly worth while to give it a name as it comes so close to the typical form.

Belgian Congo.— Very common: 33 ♀♀ and 18 ♂♂ from Malela, Basoko, Stanleyville, Bengamisa, Bafwasende, between Panga and Banalia, Avakubi, Poko, Akenge, Walikale, and Lubutu.

69. **Synagris cornuta** var. **rufithorax,** new variety

Plate II, Figure 1

♀.— Coloration nearly as in the typical form, but the thorax entirely ferruginous-red; the vertex with only a small black spot around the ocelli; the first abdominal segment broadly ferruginous-red on its base. This is the var. *b* of H. de Saussure[1] or var. 1 of Schletterer.[2]

Belgian Congo.— Malela, 2 ♀♀, July 1915 (Lang and Chapin Coll.).

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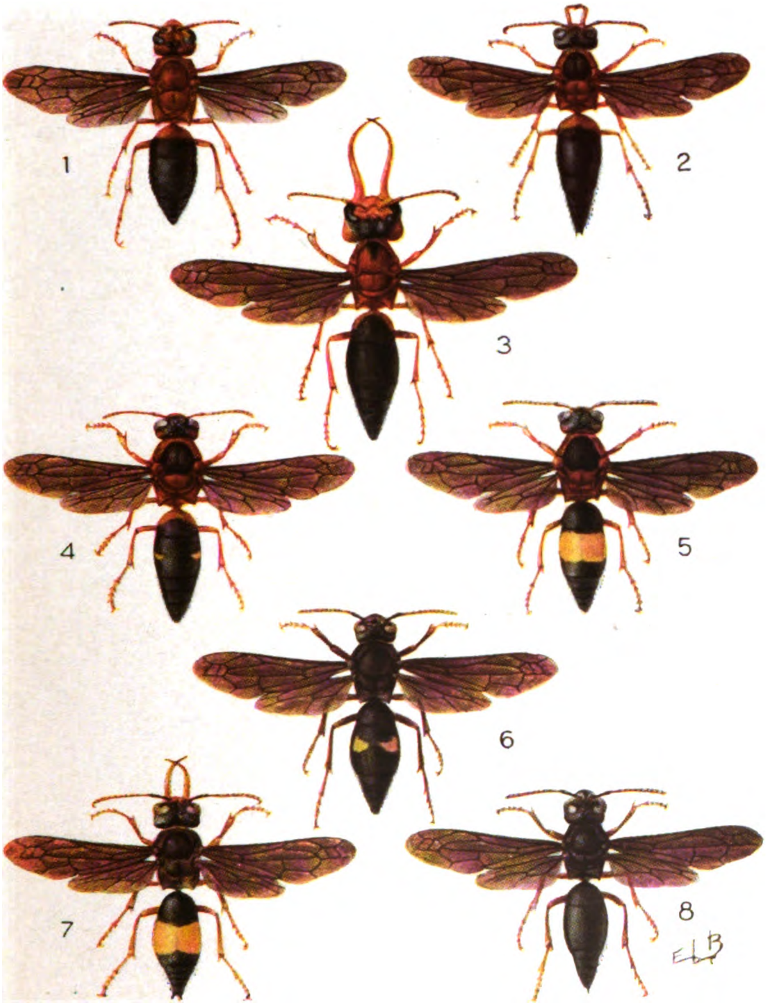
[1] Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 180.

[2] Ann. Soc. ent. Belgique, XXXV, 1891, p. 20.



Color varieties of *Synagris cornuta* (Linné)
All natural size

Fig. 1. Variety *rufithorax* J. Beq.
Fig. 2. Variety *cornuta* (Linné).
Fig. 3. Variety *ituriensis* J. Beq.
Fig. 4. Variety *didieri* (R. du Buyss.).

Fig. 5. Variety *basalis* (Mocs.).
Fig. 6. Variety *maculata* J. Beq.
Fig. 7. Variety *flavofasciata* J. Beq.
Fig. 8. Variety *similis* J. Beq.

70. **Synagris cornuta** var. **ituriensis**, new variety

Plate II, Figure 3

♀ and ♂.— Coloration intermediate between the typical form and the var. *rufithorax*. Head, thorax, and legs ferruginous-red, except for the vertex, which is entirely black, and a black, elongate, median spot on the mesonotum; this black spot starts on the anterior margin, where it is broadest, and its extremity is regularly rounded and situated a short distance from the posterior margin of the mesonotum. Mesosternum partly black. Abdomen black; the basal half of the first tergite and the first sternite entirely, ferruginous-red. In one of the specimens the black mark of the mesonotum is much reduced.

Belgian Congo.— I have seen 13 ♀♀ belonging to this color variation, which were collected from a colony in a house, at Risimu (Batama, near Bafwaboli), September 1909; one of these females is the holotype. In other nests of the same colony were collected females of the subtypical form of *S. cornuta* (Linné) with the mesonotum entirely black. This variety exists also at Stanleyville, together with the subtypical form: 1 ♀ and 2 ♂♂, April 1915, one of these males being the allotype.

71. **Synagris cornuta** var. **basalis** (Mocsáry)

Plate II, Figure 5

This remarkable variety has the same coloration as the typical form, except for a broad, pale yellow fascia on the base of the second tergite; the first segment may be rufous on its extreme base or entirely black.

Belgian Congo.— Apparently not rare in its northeastern part. Messrs. Lang and Chapin collected 26 ♀♀ and 2 ♂♂ at Niangara, Medje, and Poko; and a fine male of this variety was taken at Yakuluku by my friend Dr. Rodhain.

72. **Synagris cornuta** var. **didieri** (R. du Buysson)

Plate II, Figure 4

Belgian Congo.— Poko, 2 ♀♀, taken together with the preceding variety from the same colony. This is the var. 3 described by Schletterer from the Belgian Congo (Equateur).[1]

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[1] Ann. Soc. ent. Belgique, XXXV, 1891, p. 20.

73. **Synagris cornuta** var. **flavofasciata,** new variety

Plate II, Figure 7

♀ and ♂.— Similar to the var. *basalis*, but head and thorax are nearly entirely black; the ferruginous-red color is restricted to more or less extended portions of the antennæ, mandibles (together with the horns in the ♂), clypeus, and legs, and sometimes also of the sides of scutellum and postscutellum; the base of the abdomen is black. The yellow fascia on tergite 2 is very broad; in one of my specimens it covers nearly the whole surface, only a broad posterior median triangle, connected with a narrow apical band, remaining black.

Belgian Congo.— I have seen 3 ♀ ♀ and 2 ♂♂ of this form from Medje (one of the females is the holotype, one of the males the allotype) and 1 ♀ from Bafwabaka (Lang and Chapin Coll.). I collected a fine pair at Kambi na Mambuti (between Penge and Irumu, March 1914), where the female was building its clay nest under the roof of the rest house.

74. **Synagris cornuta** var. **similis,** new variety

Plate II, Figure 8

♀ and ♂.— This form is apparently related to the preceding, from which it differs only by the absence of the yellow transverse fascia on the second tergite; the abdomen is entirely black; head, thorax, and legs are as in the var. *flavofasciata*.

Belgian Congo.— This variety is common in some localities of the northeastern Congo Forest. Three ♂♂ and 1 ♀, in the collection of the Congo Expedition from Medje, January 1914, belong to it; the female is the holotype, and one of the males the allotype. I found it to be the only form of the species in the Semliki Forest (Lesse and villages of the vicinity; 9 ♀ ♀ and 1 ♂, June and July 1914).

I have explained before why I believe that this color form of *S. cornuta* might prove to be the same insect as Maidl's species *S. similis*.

75. **Synagris cornuta** var. **maculata,** new variety

Plate II, Figure 6

♀.— Intermediate as regards coloration between the var. *similis* and the var. *flavofasciata;* black and ferruginous-red as in the var. *flavofasciata;* the second abdominal tergite with two lateral whitish spots..

Belgian Congo.— Medje, 1 ♀, July 22, 1910 (Lang and Chapin Coll.).

This color form is probably the same insect as *S. similis* var. *maculata* Maidl.

Ethology. Ed. André,[1] in 1895, described briefly the nest of *S. cornuta* (Linné), and R. du Buysson, in 1908, that of *S. cornuta* var. *didieri* (R. du Buysson).[2] However, we are indebted to E. Roubaud[3] for the first extensive account of the life history of this remarkable wasp.

Synagris cornuta builds a mud nest very similar to that of other species of this genus. In conformity with the size of the wasp, the nest may be rather large; but its cells are never very numerous, their average number being six. The small number of cells is the result of the aberrant behavior of this species; for *S. cornuta* feeds a single larva from day to day with caterpillars ground up into a paste which it brings to the mouth of its offspring in the same manner as do social wasps. Under ordinary conditions, about one month is required by the mother wasp to rear her young from the laying of the egg to the closing of the cell above the full-grown larva; only after the orifice of this one cell is closed, does the female resume her original work of mason and build at the side of the closed cell a new one of the same type. The males do not participate in the construction or protection of the nest, nor in the rearing of the young; yet they are not entirely indifferent to the work of the females; they know all the nests that might be found in a given area and visit them regularly, doubtless for the purpose of seizing virgin females as soon as they emerge. The horn-like appendages of the mandibles of the males may play some rôle in copulation, as suggested by Lepeletier de St. Fargeau.[4] Roubaud once observed that two males, who met on the same nest, repelled each other with their large pincers. The big Ichneumon wasp, *Osprynchotus violator* (Thunberg),[5] and a beetle of the family Rhipiphoridæ are known to parasitize the larvæ of this *Synagris*.

Mr. H. Lang has made some observations on the habits of this wasp; they are valuable in as much as they show that the different color varieties which were described above do not differ in their behavior from the typical form studied by Roubaud.

A large colony of the subtypical form of *S. cornuta* (Linné) was photographed by Mr. Lang at Bengamisa, September 27, 1914. Several hundred mud nests were built close together inside a house, on the under side of the ceiling which was thatched with the leaf-stalks of a Raphia Palm. Some of these nests (Plate III) show very distinctly the short neck with its slightly widened opening, curved to the side and downwards; such a chimney is built at the entrance of the cells containing eggs or larvæ still nursed by a female. This necked entrance must not be confused with the numerous openings seen on some of the mud lumps and which were made by emerging adults. Two or even three such bent necks may occasionally be found on a single mud lump, which proves that several females may become very closely associated in such colonies. Such associations of females are similar to those described by A. Ducke for *Zethus lobulatus* Saussure, a South American solitary wasp which also feeds a single larva from day to day with caterpillars.[1] Mr. Lang caught a female of *Osprynchotus violator* (Thunberg) flying around the nests of this colony.

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[1] Revue d'Entom., Caen, XIV, 1895, p. 352. Many years before H. Lucas, Ann. Soc. entom. France, (5), VII, 1877, Bull. entom., p. clvi, described a black nest of resinous material, collected at Bagamoyo (east coast of Africa), which he attributed to a species of the genus *Synagris*. It is very doubtful whether this wasp was *S. cornuta*, since that species is not recorded from East Africa; furthermore, *S. cornuta* builds ordinary mud nests, without any addition of resinous material.

[2] Revue d'Entom., Caen, XXVII, 1908, p. 215 (nest collected near Irebu by L. Didier).

[3] C. R. Ac. Sc. Paris, CXLVII, 1908, p. 696; Ann. Soc. ent. France, LXXIX, 1910, pp. 7–16. A translation of these important observations may be found in the Annual report of the Smithsonian Institution for 1910; 1911, pp. 513–521.

[4] Hist. nat. Ins. Hym., II, 1841, p. 592.

[5] = *Osprynchotus flavipes* Brullé, *O. heros* Schetterer, etc. See W. A. Schulz, Zool. Annal. Würzburg, IV, 1–2, 1911, pp. 35–37; Berliner entom. Zeitschr., LVII, 1912, pp. 63–64.

Another nest collected with its occupants at Medje, July 17, 1910, has been referred to before (p. 199). It was fixed on a stick underneath the thatched roof of a building and was built of pale brownish clay and white kaolin, the latter material forming the external cover of the nest. The kaolin was collected by the mother wasp from the walls of the houses, which in the Congo are often whitewashed with this substance. Regarding this, Mr. Lang remarks in his field notes: "The whitish clay on the houses is a rather powdery sort of material. But, as was observed repeatedly, these wasps go down to the brook, a distance of about 250 yards, to suck moisture from the sand at the edge of the water; then they come to the walls of the house, break off the kaolin with their mandibles, mix it with their supply of moisture and with saliva, rolling it between the front legs and kneading it with the mandibles. The resulting lump of mortar, 4 to 5 mm. in diameter, is held between the front legs as they fly off to the nest. The finished structure is remarkably strong and tough." This nest consisted of six cells, five of which were closed; the mother wasp was found sitting in the sixth cell, which was open and contained an egg. The closed cells contained respectively: a nearly adult pupa, already fully colored; a still uncolored pupa; a large full-sized larva; a smaller full-grown larva; and an adult parasite (*Osprynchotus violator*) inside a pale yellow cocoon. This *Osprynchotus* cocoon is membranaceous, translucent, and smooth on its inner side; it is connected with the mud wall of the cell by means of a few silky threads. In the cells which contained pupæ and larvæ of *Synagris* no debris of the larval food could be discovered, which is in agreement with the peculiar nursing habits of this species. But in the parasitized cell I found, outside of the silky cocoon containing the Ichneumon wasp, the remains of a *Synagris* pupa, where parts of the legs, antennæ, and head with ocelli could be easily recognized. This proves that the parasite might have infected the cell only after the full-grown larva had changed into the pupal stage; or, what is more likely, the larva became infected in an earlier stage, when it was still nursed by its mother, but the infection did not prevent its transformation into a pupa. In a recent paper, Roubaud states that, in a parasitized cell of *Synagris cornuta*, the *Osprynchotus* larva, after having devoured the wasp larva, must be fed with ground up prey from day to day by the mother wasp till it is full-grown; the intruder thus usurping entirely the place and rights of the legitimate offspring.[1] But the presence in a closed cell of remains of a *Synagris* pupa together with an *Osprynchotus* pupa, clearly shows that this process is not indispensable. The inhabitants of this nest belong to the var. *flavofasciata*. Other nests of this variety were collected in the same locality. Mr. Lang remarks that the neck at the entrance of the open cell may sometimes be long enough to be compared to a funnel. One of the nests was recently started; it consisted of a single cell in which the mother wasp was found feeding on a piece of caterpillar.

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[1] Zool. Jahrb. Abt. f. Syst., XXXVI, 1914, p. 325 (see p. 32).

The photograph, Plate IV, Fig. 1, shows a mother wasp of the var. *flavofasciata* sitting outside her nest, which was, as in the preceding cases, fixed on a stick beneath a roof. This nest is shown natural size; it is a lump nearly entirely built of the white kaolin collected on house walls in the manner referred to above. Its four cells were somewhat irregularly united; the open cell did not contain either an egg or a larva, but the mother wasp was usually sitting in it, her head directed outward. She was observed in this position for two days. The orifice of this empty cell is also slightly curved downward in a short neck. The other cells contained respectively a fully developed female ready to emerge, a still uncolored pupa, and a full-grown larva. The adult female which was enclosed in the nest showed only small, lateral, pale spots on the second abdominal tergite, whereas the mother wasp was adorned with a continuous broad, transverse, ivory-white fascia.

Mr. Lang also describes in his field notes a colony of the subtypical form at Risimu (Batama), September 7, 1909. In this case, some thirty nests were spread over a length of 6 feet on the under side of a stick supporting a roof.

Mr. J. Chapin describes a nest of the same subtypical *S. cornuta* located on the under side of a *Borassus* leaf (Leopoldville, July 11, 1909); this nest was a roughly oblong mud lump containing 5 cells, two of which were empty

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[1] Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 15, footnote. In his previous paper on the ethology of *Synagris cornuta*, Roubaud does not draw this conclusion: he merely explains how parasitism by *Osprynchotus* may lengthen the rearing period of the wasp larva (Ann. Soc. entom. France, LXXIX, 1910, p. 14).

(left by the adults) and two contained pupæ; in the fifth was found a young larva and in this cell the mother wasp was accustomed to sit with her head at the entrance. Another wasp with larger mandibles (a male) sometimes came to the outside of the nest.

Subgenus **Paragris** H. de Saussure

Key to the Congo Species

Females

1. Clypeus entirely or nearly entirely covered with minute, more or less distinct, confluent longitudinal striæ..2.
   Clypeus never extensively covered with longitudinal striation, its surface often smooth or with scattered punctures. Vertex always with a hairy fovea..6.

2. Second abdominal sternite with two strong and sharp longitudinal carinæ near its base. Concavity of the propodeum almost without sculpture, its dorsal areas densely and coarsely, rugosely reticulate; its lateral angles projecting as feeble spines; the inferior ridge between this spine and the insertion of the abdomen compressed into a broad, somewhat discolored lamella. Vertex with a hairy fovea. Length (h. + th. + t. 1 + 2), 16 mm.
   S. rufopicta Tullgren.
   Second abdominal sternite without longitudinal carinæ. Lateral angles of the propodeum forming distinct spiny protuberances, the inferior ridge not flattened into a lamella..3.

3. Vertex without hairy fovea. Punctation on head, thorax, and abdomen, faintly marked. Concavity of the propodeum smooth, its dorsal areas with irregular transverse striæ. Clypeus shaped as in *S. huberti*. Black, with brownish-red spots on head, thorax, and base of the abdomen; the antennæ and legs also brownish-red; the mesonotum black (these two colors distributed much as in typical *S. cornuta*); abdomen with 6 pairs of whitish-yellow spots, one pair on tergites 1, 3, 4, and 5 and two pairs on tergite 2. Total length, 18 mm. This species has been described from the forest region of the northeastern Belgian Congo (after Maidl)......................*S. ornatissima* Maidl.
   Vertex with a distinct hairy fovea. Punctation distinct, especially on the head. Sculpture of the propodeum different........................4.

4. Clypeus elongate and piriform; its wide apex broadly rounded at the edges; the striation of its surface only feebly marked. Transverse striation of the concavity of the propodeum strong, extending over the whole of its dorsal areas; its lateral spines well developed. Second abdominal sternite feebly raised on its middle towards its base. Pubescence of the thorax ochre-yellow and somewhat velvety.[1] Length (h. + th. + t. 1 + 2), 20 to 24 mm.
   S. æstuans Saussure.

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[1] Only visible on fresh or perfectly preserved specimens.

Clypeus shorter piriform; its apex comparatively narrow, straightly truncate or feebly sinuate, often with sharp, subcarinate edges. Dorsal areas of the propodeum rugosely reticulate, without distinct transverse striæ.........5.

5. Larger species; length (h. + th. + t. 1 + 2), 18 to 23 mm. Second abdominal sternite feebly convex towards its base; not projecting more on its middle than on its sides; its median line slightly depressed; in front of its hind margin there are two transverse (often inconspicuous) ridges. Transverse striation on the concavity of the propodeum very distinct. *S. abyssinica* Guérin.

Smaller species; length (h. + th. + t. 1 + 2), 16 mm. Second abdominal sternite gradually flattened towards its base, without depressed median line and without transverse preapical ridges. Striation on the concavity of the propodeum very feeble..........................*S. huberti* Saussure.

6. Clypeus broadly piriform; with broadly truncate and somewhat rounded apical margin; its surface distinctly flattened, depressed, or slightly excavated over its apical fourth...7.

Clypeus more or less piriform; convexly swollen throughout or very narrowly flattened into a preapical margin. Striation of the concavity of the propodeum always extending over its dorsal areas. Basal part of the second abdominal sternite more or less distinctly raised on its middle, where it projects more than on its sides, markedly depressed behind this median raised part...9.

7. Hind tarsi much broadened and comparatively short; their third joint about as long as broad at its apex. Apical part of the clypeus only flattened, not excavated. Second abdominal sternite uniformly convex; gradually sloping towards its base; not projecting more on its middle than on its sides. Striation of the dorsal areas of the propodeum irregular, more or less reticulate. Length (h. + th. + t. 1 + 2), 24 mm..........*S. crassipes* Kohl.

Hind tarsi normal, slender, their third joint distinctly longer than broad at its apex. Striation of the propodeum distinct and regular on its dorsal areas as well as in its concavity.....................................8.

8. Basal part of the second abdominal sternite slightly, although distinctly flattened behind this median raised part. Clypeus as a rule distinctly depressed or more or less excavated on its apical quarter. Length (h. + th. + t. 1 + 2), 18 to 23 mm.....................................*S. calida* (Linné).

Basal part of the second abdominal sternite regularly, convexly sloping, not raised more on its middle than on its sides. Apical part of the clypeus as a rule flattened, never excavated. Total length, 22 to 25 mm. (after Maidl). *S. kohli* Maidl.

9.[1] Two or three apical abdominal tergites with more or less extensive white markings; the rest of the body black; the clypeus, a few spots on head, mandibles, under side of the antennæ, and terminal joint of the front tarsi, ferruginous-red. Shape of the clypeus much as in *S. analis;* elongate and piriform; its apical part comparatively long and narrow. Length (h. + th. + t. 1 + 2), 20 mm. This species exists in the Upper Katanga; I have seen a ♀ from Zanzibar...*S. mirabilis* Guérin.

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[1] *S. mirabilis*, *S. analis*, *S. spiniventris*, and *S. negusi* are, with regard to structural characters, very similar in the females, although the males can be easily separated. Since I have not seen the female of *S. negusi*, I was compelled to use here chiefly the coloration, on which Maidl's key is based for a large part.

Terminal abdominal tergites orange or ferruginous-red..................10.

10. The four apical abdominal tergites and sternites for the greater part orange- or ferruginous-red. Shape of the clypeus as described for *S. mirabilis.* Length (h. + th. + t. 1 + 2), 21 mm.................*S. analis* Saussure.

Only three apical abdominal tergites and sternites for the greater part orange- or ferruginous-red. Clypeus, although distinctly piriform and longer than broad, yet clearly shorter than in *S. analis* and *S. mirabilis;* its apical part comparatively shorter and broader.................................11.

11. Clypeus ferruginous-red, with distinct punctures which are only a little finer than on the vertex; its surface dull, its terminal portion a little narrower, never with a preapical transverse impression. Length (h. + th. + t. 1 + 2), 19 to 23 mm.................................*S. spiniventris* (Illiger).

Clypeus orange-yellow or ferruginous-red, somewhat shining; its punctures distinctly finer than on the vertex; its terminal portion somewhat broader; as a rule with a more or less distinct, transverse, preapical impression. The coloration is the same as in the preceding species. Total length, 21 to 26 mm. This species was found northwest of Lake Tanganyika; (after Maidl).
S. negusi R. du Buysson.

Males[1]

1. Second abdominal sternite with two strong and sharp, longitudinal carinæ near its base. Shape and sculpture of the propodeum as in the ♀. Clypeus (Fig. 234) with broadly truncate apical margin; its entire surface finely shagreened. Terminal hook of the antennæ (Figs. 235 and 236) very long and slender; strongly curved. Length (h. + th. + t. 1 + 2), 13 mm.
S. rufopicta Tullgren.

Second abdominal sternite without longitudinal carinæ near its base. Lateral angles of the propodeum forming more or less distinct, spiny protuberances; its inferior ridge not flattened into a lamella.........................2.

2. Clypeus short piriform; about as long as broad or slightly longer; pointed towards its rounded apex (somewhat as in *S. cornuta* ♀). Second abdominal sternite often with spiny protuberances near its hind margin..........3.

Clypeus differently shaped; never pointed towards its apex, which is either broadly truncate or emarginate. Mandibles never with basal protuberances on their external face...4.

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[1] As was shown very completely by Maidl, there is much individual variation in the shape and development of the secondary sexual characters (shape and protuberances of the mandibles, protuberances of the second sternite, shape of the clypeus, etc.) of the *Synagris* males. A remarkable correlation exists between the development of these characters and the size of the specimens, the larger individuals always exhibiting these specific peculiarities in the most distinct manner. The male of *S. ornatissima* Maidl is unknown.

3. Mandibles, as a rule, with more or less marked protuberances or horns on their external face near their base; their inner margin abnormally incurved and dentate. Clypeus scarcely longer than broad; with narrowly rounded apex. Coloration as in the ♀: black, with the four terminal abdominal segments and the clypeus ferruginous-red. Total length, 22 to 25 mm. (after Maidl). *S. negusi* R. du Buysson.

Mandibles never with basal protuberances on their external face; their inner margin nearly as in the ♀. Clypeus slightly longer than broad; with broadly rounded apex. Coloration of the typical form black, with head, thorax, legs, and base of the abdomen more or less brownish-red; clypeus and spots on head, thorax, and abdominal tergites 1 to 6, whitish-yellow. Length (h. + th. + t. 1 + 2), 23 mm.................... *S. æstuans* Saussure.

4. Apical margin of the clypeus deeply and distinctly emarginate, bidentate, or bifid..5.

Apical margin of the clypeus straightly or roundly truncate, or very feebly emarginate, never bidentate.......................................7.

5. Apical margin of the clypeus semicircularly emarginate; its lateral edges short, sharply dentate, and widely separate. Mandibles shaped almost as in the ♀. Second abdominal sternite with two transverse, more or less conspicuous, preapical ridges (as in the ♀). Dorsal areas of the propodeum rugosely reticulate; its concavity with distinct transverse striæ. Length (h. + th. + t. 1 + 2), 19 mm.............................. *S. abyssinica* Guérin.

Apical margin of the clypeus deeply bifid; its lateral edges much broader and bluntly dentate. Mandibles abnormal; very different in shape from those of the ♀...6.

6. Clypeus much broader than long; its apex very deeply and narrowly emarginate; its lateral edges forming two broad, blunt appendages. Mandibles, as seen in front, with a broader basal half and a distinctly constricted, narrower apical half. Second abdominal sternite often with more or less developed preapical protuberances or spines. Striation of the concavity of the propodeum very distinct and extending over its dorsal areas. Coloration as in the ♀, the three or four terminal abdominal tergites more or less extensively white. Total length, 20 to 27 mm. (after Maidl). *S. mirabilis* Guérin.

Clypeus nearly as long as broad; not so deeply bifid as in the preceding species; its lateral edges triangular. Mandibles deeply emarginate and dentate along their inner margin, but not constricted into a broader, basal and a narrower, apical half. Second abdominal sternite without preapical protuberances. Striation of the concavity of the propodeum very feeble; its dorsal areas rugosely reticulate. Coloration variable, as in the ♀. Total length, 16 to 20 mm. (after Maidl)............................*S. huberti* Saussure.

7. Second abdominal tergite much widened, feebly depressed on each side of its middle line; the depressed parts margined by two irregular folds or ridges which look like an artificial deformation of the integument; the second sternite with two more or less marked, often extremely strong, preapical protuberances. Mandibles almost normal; scarcely different from those of the ♀. Hind tarsi much broadened and comparatively short. Striation of the propodeum more or less broken up into a rugose reticulation on its dorsal areas. Length (h. + th. + t. 1 + 2), 23 to 24 mm. *S. crassipes* Kohl.

Second abdominal tergite normal; without longitudinal ridges. Mandibles more or less deformed by notches and teeth of their inner margin; often strongly curved. Hind tarsi normal; slender. Striation of the propodeum covering uniformly its concavity and its dorsal areas....................8.

8. Clypeus about as broad as long, or slightly longer; its apical part distinctly elongate and straightly truncate; its surface more or less depressed on its apical part, often with a deep, semicircular, terminal excavation margined by strong ridges and discolored in the bottom. Second abdominal sternite, as a rule, with more or less developed preapical spines or protuberances. Anterior face of the middle coxæ raised into a more or less distinct median tubercle. Middle femora not flattened. Length (h. + th. + t. 1 + 2), 18 to 26 mm...................................*S. spiniventris* (Illiger).

Clypeus never semicircularly excavated at its apex, at most with a narrow, terminal, depressed margin. Second abdominal sternite never with spines. either flat or with two blunt, more or less distinct, preapical protuberances..9.

9. Clypeus, as a rule, distinctly longer than broad; its elongate terminal part more or less flattened or slightly depressed on its sides; its apical margin scarcely thickened, straightly truncate with rounded edges or feebly emarginate. Middle femora distinctly flattened; their anterior face with a feeble oblique depression towards their base; their inferior margin markedly projecting on its apical third. Length (h. + th. + t. 1 + 2), 16 to 22 mm. *S. analis* Saussure.

Middle femora normally convex at their anterior face. Clypeus of different shape...10.

10. Clypeus as broad as, or distinctly broader than, long; its terminal part very short and broadly truncate; its apical margin either straight or slightly emarginate, with sharp, somewhat raised lateral edges; often with a narrow, depressed, terminal lamella. Anterior face of the middle coxæ without raised median tubercle. Length (h. + th. + t. 1 + 2), 18 to 23 mm. *S. calida* (Linné).

Clypeus about as long as broad; its terminal part distinctly longer and more narrowly truncate; its apical margin straightly truncate, swollen, and somewhat projecting above the terminal, almost vertical lamella. Length (h. + th. + t. 1 + 2), 19 mm.........................*S. kohli* Maidl.

76. **Synagris analis** H. de Saussure

Belgian Congo.— Banana, 2 ♂♂, September 1915 (Lang and Chapin Coll.). This species has been found also northwest of Lake Tanganyika[1] and at Lukonzolwa (Lake Moero).[2] I have seen a female and a male from Portuguese East Africa, in the collection of Cornell University.

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[1] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 257.

[2] E. Zavattari, Boll. Mus. Zool. Anat. Comp. Torino, XXII, No. 555, 1907, p. 3 (*S. heydeniana* Saussure).

The Congo specimens belong to the typical form which is black with the four (♀) or five (♂) apical abdominal segments entirely or partly orange-red. The clypeus, the frontal raised triangle between the antennæ, the under side of the flagellum, and the terminal joint of the tarsi are ferruginous-red or orange-yellow in the female, bright orange in the male.

Maidl has described as "subspecies" *nigroclypeata* Maidl, a color form from German Southwest Africa, which hardly deserves a name as a variety; it differs from the typical form only in that the clypeus in the female is more or less extensively black; the males from the same region do not present that peculiarity.

S. analis is apparently restricted to the eastern and southern savannah regions not being found west of the Nile nor in the Central African rain forest. It ranges on the East Coast from Port Elizabeth to Eritrea; on the West Coast from 20° S. to 5° S. (Chinchoxo, at the mouth of the Shiloango River); its northern limits in the interior are Uganda, the northwestern corner of Lake Tanganyika, Lake Moero, and Northern Rhodesia. The records of this species for Madagascar and Senegal seem to me extremely doubtful.

I was unable to discover any reliable morphological character to separate *S. analis* and *S. mirabilis* in the female, though the males of both species can be easily recognized.

77. **Synagris kohli** Maidl

Belgian Congo.— Poko, 1 ♂ (Lang and Chapin Coll.). Previous records from the Belgian Congo[1] are all from the eastern forest region: Beni, Mawambi, Moera, and 50 km. east of Kasongo. The Buamba forest (in the valley of the Semliki River), where this species was also collected, extends partly into the territory of the Belgian Congo.

The coloration of this species is similar to that of *S. analis*, the four (♀) or five (♂) apical abdominal segments being more or less extensively orange-red; the clypeus, however, is entirely or nearly entirely black in both sexes.

The localities from which this species has been definitely recorded seem to show that it is restricted to the West African forest province: Togo, Cameroon, Spanish Guinea, Belgian Congo, and Uganda.

78. **Synagris spiniventris** (Illiger)

Belgian Congo.— Faradje, 30 ♀♀ and 7 ♂♂, from November 1912 to January 1913; Garamba, 1 ♀ and 2 ♂♂, July 1912; Aba, 1 ♀,

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[1] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 260.

December 1912; north of the Aka River, 1 ♀, September 1911 (Lang and Chapin Coll.). Kabare, 1 ♂, August 1914 (J. Bequaert Coll.).

This species is black with the three (♀) or four (♂) apical segments of the abdomen partly or entirely orange-red; the clypeus and spots on the head, on the antennæ, and on the legs, ferruginous-red.

Ethology. E. Roubaud[1] has published valuable information with regard to the habits of this species, which he observed in the French Congo, the Dahomey, and the Sudan; it is, like its relatives, a true potter wasp, building mud cells aggregated in an irregular mass; the different cells may be externally distinct even in a completed nest (*type dissocié* of Roubaud) or they may be hidden beneath a general and uniform covering of mud (*type compact* of Roubaud). Under normal conditions, when food is plentiful, the female lays an egg, fills the cell with caterpillars, and then walls up the orifice, taking no further care of her offspring; this is the ordinary way, called by Roubaud *provisioning in mass* ("approvisionnement banal en masse"). However, when, owing to seasonal or climatic influences, food becomes scarcer, the mother wasp lays an egg in her cell of earth; then, without haste, after having guarded it for some time, she begins to collect a small provision of entire, paralyzed caterpillars for the time of hatching; when the larva has started to feed, the female continues its provisioning but in a slow and regular manner; as soon as the larva has attained three-quarters of its full size, the wasp encloses it in its cell with the last provisions. This is a *progressive provisioning* ("approvisionnement ralenti") from day to day, which gives the wasp the necessary leisure to guard the larva and watch its growth.

In *S. spiniventris*, progressive provisioning is still optional, and one observes all the transitional stages between this behavior and the normal provisioning in mass. The mother wasp shows great skill in adapting her habits to the external conditions. It is interesting to note that, according to Roubaud's observations, in another African solitary wasp, *Odynerus tropicalis* Saussure (p. 185), progressive provisioning has become the rule.

Many interesting parasites have been reared by Roubaud from the nests of *S. spiniventris*, the two most typical being a large Ichneumonid, *Osprynchotus violator* (Thunberg) and a Rhipiphorid, *Macrosiagon* (*Emenadia*) *ferrugineum* (Fabricius) var. *flabellatum* (Fabricius). The larvæ of both these insects feed externally on the wasp larva. A smaller Ichneumonid, *Mesostenus tripartitus* Brullé, is less common than the two preceding parasites.

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[1] C. R. Ac. Sc. Paris, CXLVII, 1908, p. 695; Ann. Soc. entom. France, LXXIX, 1910, pp. 2 and 3, Tab. I, figs. 1 and 4; Tab. IV, figs. 4 and 5; Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 3–16, figs. 1, 3, and 5. I have followed Maidl in considering Roubaud's observations on his "*S. calida*" as referring to *S. spiniventris* (Illiger).

Mr. H. Lang collected at Faradje mud nests of *S. spiniventris* together with their inhabitants. They were fixed inside native huts, on or near the ground, sometimes on sticks. These nests are of the same type as those of other species of the genus; the cells are usually large, measuring as much as 55 mm. in length and 35 mm. in width; in one of the cells were found light green caterpillars.

79. **Synagris calida** (Linné)

Belgian Congo.— I have seen 85 ♀ ♀ and 43 ♂♂ from the following localities: Banana, Zambi, Boma, Matadi, Thysville, Coquilhatville, Stanleyville, Bafwasende, Avakubi, Panga, Banalia, Medje, Garamba, Faradje, and Aba (Lang and Chapin Coll.); Kirundu, 1 ♀ (J. Bequaert Coll.). This is, together with *S. cornuta* (Linné), the most abundant species of the genus in the Belgian Congo. It had previously been recorded from Banana,[1] Mawambi,[2] and numerous other localities.[3]

The coloration is the same as in *S. spiniventris* (Illiger).

Ethology. The first observations on this species were made by Gueinzius in Natal.[4] He observed how a female was building a mud cell with red-earth on the surface of a door, and how she collected larvæ of Noctuidæ. In one of the nests described by Smith, four cells were visible. Taschenberg has described as a parasite of this species an Ichneumonid, *Atractodes gueinzii* Taschenberg, which, according to the description, is probably one of the previously described *Osprynchotus;* Gueinzius saw a female of one of these parasites piercing the mud walls of the wasp cells with its ovipositor.

The habits of *S. calida* (Linné) have also been studied by E. Roubaud[5] in the French Congo and the Casamance. According to these observations they are similar to those of *S. spiniventris* (Illiger), to which the reader may be referred.

Mud nests of *S. calida* (Linné) were collected by Mr. H. Lang at Stanleyville. One of them is of very large size, measuring 9 cm. in length, 6.5 cm. in width, and 4 cm. in height; it consists of 10 cells, which are placed side by side, their longest axis almost vertical to the surface to which the nest was attached. These nests were stored with green caterpillars and from one of the cells were reared two specimens of the rhipiphorid beetle, *Macrosiagon* (*Emenadia*) *ferrugineum* (Fabricius) var. *flabellatum* (Fabricius).

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[1] C. Ritsema, Tijdschr. v. Entom., XVII, 1874, p. 97 (*S. combusta* Saussure).

[2] A. v. Schulthess, Wiss. Ergebn. D. Z. Afr. Exp., (1907–08), IV, Lf. 10, 1912, p. 292 (*S. mandibularis* Saussure).

[3] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 268–269.

[4] Gueinzius, Trans. Ent. Soc. London, (2), V, 1858, p. 9; F. Smith, idem, (2), III, 1856, p. 128; Taschenberg, Zeitschr. f. d. ges. Naturw. Halle, XXXIX, 1872, pp. 1–5.

[5] C. R. Ac. Sc. Paris, CXLVII, 1908, p. 696; Ann. Soc. entom. France, LXXIX, 1910, pp. 3–7, Pl. I, figs. 1 and 3, and Pl. II; Ann. Sc. Nat. Zool., (10), 1, 1916, pp. 3–16, figs. 2 and 4. According to Maidl, Roubaud's *S. sicheliana* is the true *S. calida* (Linné).

Synagris abyssinica Guérin

I have figured the tarsal claw of the female of this species (Fig. 230) in order to compare it with that of *S. cornuta*.

This is one of the common species in South and East Africa; its northern limits are apparently the mouth of the Congo on the western coast, and Abyssinia in the East; inland it was found as far north as the Katanga and the northeastern Congo; towards the south it extends to Port Elizabeth and latitude 20° S. Its range covers almost exactly that of *S. analis* Saussure.

Three different color forms are known for this species; they may be separated as follows:

1. Black, with the three (♀) or four (♂) apical abdominal segments ivory-white. Clypeus, spots on head and mandibles, ferruginous-red.
var. *albofasciata* Maidl.
Apical abdominal segments orange-yellow. Clypeus and spots on head and mandibles, more or less ferruginous or orange-red........................2.
2. Black, with the three (♀) or four (♂) apical segments orange-yellow.
typical *S. abyssinica* Guérin.
Black, with the four (♀) or five (♂) apical segments orange-yellow.
var. *emarginata* (Saussure).

80. **Synagris abyssinica** Guérin, typical form

The typical form exists in the northeastern part of the Belgian Congo: Faradje, 1 ♀, November 1912; Garamba 1 ♀ and 1 ♂, July 1912 (Lang and Chapin Coll.). It was previously recorded from the same region: between Irumu and Mawambi.[1]

81. **Synagris abyssinica** var. **emarginata** (Saussure)

Belgian Congo.— Kwamouth, 1 ♀, May 24, 1915 (Lang and Chapin Coll.).

This color form was known from the eastern part of the Belgian Congo (Beni, Kasindi, northwest of Lake Tanganyika) and the Katanga (Kambove).[2]

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[1] A. v. Schulthess, Wiss. Ergebn. D. Z. Afr. Exp., (1907–08), IV, Lf. 10, 1912, p. 292 (*S. minuta* Saussure).

[2] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 277.

82. **Synagris abyssinica** var. **albofasciata** Maidl

Belgian Congo.— Faradje, 1 ♀, April 1911 (Lang and Chapin Coll.).

83. **Synagris crassipes** Kohl

Belgian Congo.— Medje, 1 ♀ and 1 ♂, July and September 1910; Avakubi, 1 ♂, October 1909; Stanleyville, 1 ♂, April 1915 (Lang and Chapin Coll.). Previously recorded from the northeastern Belgian Congo: Mawambi, Beni, Moera.[1]

This species is practically entirely black. It is a most remarkable form which seems to be restricted to the rain forest of the West African region; it occurs in Cameroon, Spanish Guinea, French Congo, Belgian Congo, and Uganda.

84. **Synagris æstuans** (Fabricius)

Plate I, Figure 6

The females which I have seen from the Congo belong to the typical form described by Fabricius.

Black; mandibles, clypeus, antennæ, cheeks, thorax (with the exception of mesonotum, scutellum, anterior part of postscutellum, and tegulæ), legs, and extreme base of abdomen, ferruginous-red. A white transverse spot on the front between the antennæ; eight white spots on the thorax (one on each side of the pronotum, scutellum, and postscutellum; and on the hind part of each tegula); and four larger, transverse white spots on the abdomen (one on each side, near the hind margin of tergites 1 and 2). This coloration is very similar to that of *Odynerus* (*Rygchium*) *æstuans* (Saussure), from which the species can be easily separated by the number of joints in the maxillary palpi, the shape of the clypeus, and the presence of two tooth-like tubercles on the postscutellum.

The only male in the collection is richer reddish-brown and presents more numerous white spots. The head, thorax, legs, and two basal segments of the abdomen are largely ferruginous-red; the vertex and mesonotum are blackish; the apical margins of tergites 1 and 2 deep black, the black on tergite 2 extending triangularly on its middle line. The following markings are ivory-white: the clypeus except for its margins; a small frontal dot; a narrow stripe in the inferior part of the emargination of the eyes; a broad band on the cheeks; 8 broad spots on the dorsal face of the thorax located as in the female; and lateral transverse, ovale spots on tergites 1 to 6, those on tergite 2 much the largest.

Belgian Congo.— Medje, 5 ♀♀, July 1910 (Lang and Chapin Coll.); 1 ♀ from the Uele region and 1 ♂ from Duru, both collected by Dr. J. Rodhain.

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[1] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 283.

This typical *S. æstuans* has been previously recorded from the Belgian Congo: Upper Maringa; between Mawambi and Irumu.[1] Its distribution covers the West African forest region: Sierra Leone, Togo, Cameroon, Fernando Po, French Congo, Belgian Congo, and Uganda.

W. A. Schulz[2] has recorded from Fernando Po a variation of *S. æstuans* in which the scutellum is uniformly black, the remaining being apparently the same as in the typical form.

The var. *rufa* ♀ Stadelmann[3] has head and thorax entirely rufous-red; the white spots are wanting on the thorax, except for a trace of such on the sides of the pronotum; tergites 1 and 2 with a spot on each side as in the typical form. This variety seems to be strictly East African; it has been recorded from German East Africa and Nyasaland only.

Synagris huberti H. de Saussure

The range of this species falls entirely within the boundaries of the West African Forest Province; it is known from Sierra Leone, the Gold Coast, Togo, Cameroon, Spanish Guinea, French Congo, Belgian Congo, and Uganda.

The following is a synoptical table of its color forms:

1. ♀.— Body without white or yellowish-white markings; black, with the head, thorax, and base of the abdomen, more or less extensively brownish-red (as in typical *S. cornuta*). ♂ similar, but the clypeus, spots on the face and on the pronotum, yellowish........................var. *clypeata* (Mocsáry).
At least the abdomen with yellow or yellowish-white spots................2.

2. ♀.— Second abdominal tergite with two large, nearly fused, whitish-yellow spots; the distribution of black and brownish-red as in the var. *clypeata*. ♂ unknown....................................var. *bimaculata* Maidl.
The three basal abdominal tergites each with a pair of whitish-yellow spots..3.

3. Distribution of black and brownish-red similar to that of the var. *clypeata;* the pronotum, scutellum, and postscutellum brownish-red; there are more or less numerous, whitish-yellow spots on head and thorax.
typical *S. huberti* Saussure.
Similar to the preceding, but the black color more extended on head and thorax; the pronotum, scutellum, and postscutellum black....var. *nigricans* Maidl.

The typical form and the var. *nigricans* are not known from the Belgian Congo. *S. huberti* var. *bimaculata* Maidl was found in the northeastern Belgian Congo: Ukaika near Mawambi.[4]

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[1] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 288.

[2] Spolia Hymenopterologica, 1906, p. 321.

[3] Deutsch Ost-Afrika, IV, 1898, Hym., p. 31, Pl., fig. 9.

[4] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 296.

85. **Synagris huberti** var. **clypeata** (Mocsáry)

Belgian Congo.— Medje, 1 ♀, July 1910 (Lang and Chapin Coll.).

This variety was previously recorded from the northeastern Congo (between Mawambi and Irumu).[1]

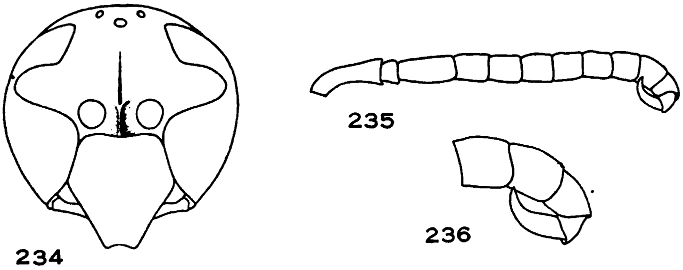
A nest of the var. *clypeata* has been described by R. du Buysson[2] from the Gaboon; it was a mud lump, 9 cm. long and 3.5 cm. broad, containing 5 cells, and fixed on a tree branch.

Maidl considers *S. rufopicta* Tullgren a synonym of this variety, whereas I believe it is a distinct species.

86. **Synagris rufopicta** Tullgren

The female has been satisfactorily described by Tullgren; the male was hitherto unknown.

♂.— Head (Fig. 234) subcircular, as seen in front. Clypeus slightly shorter than in the female; broadly piriform; about as wide as long; its apical margin broadly truncate, very feebly sinuate in its middle, with bluntly rounded lateral angles; its surface uniformly, but very feebly convex. Mandibles normal; strongly pointed; shaped almost exactly as in the female; their inner margin straight, with three feeble notches. Antennæ (Fig. 235) elongate; joints three to eleven longer than broad; terminal hook-like joint (Fig. 236) very long, gradually tapering towards a long and sharp apex, strongly curved on its middle, its apex reaching near the base of the ninth joint.



Figs. 234–236. *Synagris rufopicta* Tullgren.

Fig. 234. Head in front, ♂. Fig. 235. Antenna, ♂. Fig. 236. Terminal joints of antenna, ♂.

Thorax and abdomen as in the female; the second sternite also with a strong carinate longitudinal ridge on each side of its middle line, in its basal half. Middle femora distinctly flattened; their inferior margin slightly projecting on their basal third.

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[1] F. Maidl, *op. cit.*, p. 296.

[2] Revue d'Entom., Caen, XXVII, 1908, p. 214.

Punctation as in the female. Clypeus densely and finely shagreened all over, almost longitudinally striate; without punctures.

Coloration also similar to that of the female; the clypeus bright-yellow with brownish-red margins; the thorax is covered with the same velvety, ochre-yellow pubescence which is found in *S. æstuans* Saussure; this is also true in the female.

The chief structural characters of this species, in both sexes, reside in the shape of the clypeus and mandibles; the sharply bidentate postscutellum; the slightly projecting tooth-like lateral angles of the propodeum which continue beneath as broad lamellæ; and the two strongly carinate, longitudinal ridges in the anterior half of the second abdominal sternite. Tarsal claws bifid at their apex; without an accessory tooth in the middle. Labial palpi composed of three slender joints, as in the other *Synagris;* in all my specimens there are only three joints left on the maxillary palpi.

The coloration of the female and male from Stanleyville and of the female from the Oso River is the same as described for the type specimen from Cameroon; it imitates in the most striking manner that of the subtypical *S. cornuta* (Linné). Another female collected between Masisi and Walikale, is much darker, the black color invading nearly the whole of the abdomen, pleura, scutellum, and propodeum.

Length (h. + th. + t. 1 + 2): ♀, 13 to 17 mm.; ♂, 13 mm.

Belgian Congo.— Stanleyville, 1 ♀ and 1 ♂, May 1915 (Lang and Chapin Coll.). Oso River, 1 ♀, February 18, 1915; between Masisi and Walikale, 1 ♀, January 3, 1915 (J. Bequaert Coll.).

Synagris imitator R. du Buysson, 1908, is undoubtedly the same species as *S. rufopicta* Tullgren, 1904. R. du Buysson describes the longitudinal ventral carinæ as belonging to the first sternite, but this is certainly a mistake; all the other details of the description agree perfectly.

I cannot follow Maidl in uniting *S. rufopicta* with *S. huberti.* The longitudinal carinæ of the second sternite are only found in this species and not in *S. huberti;* furthermore, the shape of the inferior ridge of the propodeum is very peculiar; these characters hold in both sexes. Maidl has seen the male of *S. huberti* only; but the true *S. rufopicta* male is very different, as will be easily seen in comparing my description and drawings with those given by Maidl for *S. huberti.* The shape of the terminal joints of the antennæ may also be peculiar, but these organs are not described for *S. huberti.*

The typical *S. rufopicta* Tullgren has the same coloration as *S. huberti* var. *clypeata* (Mocsáry). It is remarkable that the following variety is very similar to *S. huberti* var. *bimaculata* Maidl.

87. **Synagris rufopicta** var. **mimetica,** new variety

This remarkable color form reproduces almost exactly the coloration found in *S. cornuta* (Linné) var. *basalis* (Mocsáry) (compare p. 209) and offers one of the best illustrations of the parallel variations in color pattern which are so frequently met with among the Vespidæ.

♀.— The structural characters are exactly the same as in the typical form; the longitudinal carinæ on the second sternite are very pronounced and sharp, and the inferior ridge of the propodeum is flattened into a lamella.

Vertex, front, apex and inner margin of mandibles, mesonotum, sutures of the pleura, and major part of the abdomen, black. Clypeus, a spot between the insertion of the antennæ, antennæ, major part of the mandibles, thorax (except for the mesonotum and the pleural sutures), tegulæ, legs, basal half of the first tergite, the first sternite entirely, and basal half of sternite two (including its carinæ), bright ferruginous-red. A broad, pale yellow band covers about two-thirds of the second tergite; it starts at a short distance from the base of the tergite and is slightly emarginate in the middle on its anterior and posterior margin. Wings dark brown, with purplish effulgence.

Length (h. + th. + t. 1 + 2), 16.5 mm.

Belgian Congo.— Medje, 1 ♀, September 1910 (Lang and Chapin Coll.).

Subgenus **Rhynchagris** Maidl

This group includes only one species: *S. vicaria* Stadelmann. Its typical form has the body mostly black; the three (♀) or four (♂) apical abdominal segments present ivory-white transverse bands or spots. Clypeus, antennæ, head, mandibles, and legs are more or less tinged with ferruginous-red. Total length: ♀, 18 to 23 mm.; ♂, 14 to 18 mm. It has been found in the Katanga: 150 to 200 miles W. of Kambove, Lofoi.[1]

The var. *luteopicta* Maidl has about the same color pattern as the type, but the apical segments of the abdomen are orange-yellow, instead of white; it has been recorded from Uganda and might perhaps reach the northeastern part of the Belgian Congo.

Subgenus **Pseudagris** H. de Saussure

Maidl describes three species in this group merely on differences in the color pattern. I think it would be more rational to consider them as varieties of a single specific type, if there are really no morphological characters to separate them. This I cannot decide since I have seen only one of these forms; it will be well to await the discovery of the males before attempting to solve this problem.

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[1] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 251.

Key to the Congo Species of the Subgenus *Pseudagris*.

1. Body almost entirely black; the under side of the antennæ and a few spots on mandibles and legs, ferruginous-red. Total length, 20 to 24 mm. Described from the northeastern Belgian Congo: Moera.[1]........*S. aterrima* Maidl.
   Body black, with abundant brownish-red markings on the thorax and first abdominal segment; the clypeus, antennæ, and legs of the same color; the mesonotum black. Length (h. + th. + t. 1 + 2), 13 to 16 mm...........2.
2. No yellowish-white spots..............typical *S. versicolor* A. v. Schulthess.
   Yellowish-white spots on head, thorax, and abdomen.
   S. versicolor var. *meade-waldoi* Maidl.

88. **Synagris versicolor** A. v. Schulthess

Belgian Congo.— Stanleyville, 6 ♀♀, April 1915 (Lang and Chapin Coll.).

This locality extends the range of the species far inland; it was previously known from Sierra Leone, Togo, Cameroon, and Fernando Po.

This is a very interesting form on account of its striking resemblance to certain *Odynerus* of the subgenus *Rygchium*. However, the maxillary palpi are distinctly five-jointed; their fifth joint is elongate and rounded at its apex, and it is hard to believe that there was a sixth joint in the pupal stage. The labial palpi are undoubtedly three-jointed; but the shape of the joints is very different from what is found in *S. cornuta* (Linné).

All the specimens I have seen belong to the typical form. The var. *meade-waldoi* Maidl, described from Uganda, might occur in the eastern part of the Belgian Congo.

Rhynchalastor G. Meade Waldo

The characters of this genus can be seen from the key. Its most interesting peculiarity is the shape of the clypeus, which, in both sexes, is cordate and ends in a distinctly pointed apex. It has been claimed that in the solitary diplopterous wasps the apex of the clypeus is always either truncate or emarginate. Dalla Torre[2] gives among the general characters of his subfamily Eumenidinæ "Kopfschild nie mit einem Zahne endigend"; and Zavattari[3] also states that the clypeus in his family "Eumeneidæ" never ends in a single tooth. *Rhynchalastor* is a fine illustration of a true solitary wasp with sharply pointed clypeus. Moreover, in *Synagris cornuta* (Linné) the clypeus of the female ends in a projecting, although blunt apex, which is very often more distinct than in some social wasps, such as *Polistes*. It is, on the other hand, almost useless to point to the numerous social wasps in which the apex of the clypeus is truncate or emarginate, either in both sexes or in the males, such as *Vespa, Charterginus, Clypearia,* etc. The shape of the clypeus therefore cannot be used as a character to separate the solitary diplopterous wasps and the social wasps as two families or subfamilies.

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[1] F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 247.

[2] Genera Ins. Vespidæ, 1904, p. 9.

[3] Arch. f. Naturgesch., LXXVIII, Abt. A, 1912, Heft 4, p. 3.

I have been able to study one male of the genotype, *Rhynchalastor fuscipennis* G. Meade Waldo, which was described, on the female only, from German East Africa. This wasp is very similar to *Odynerus ferruginatus* J. Bequaert (= *Stenodynerus ferrugineus* A. v. Schulthess) — so similar, indeed, that A. v. Schulthess[1] redescribed it as the var. *mafiensis* of that *Odynerus*. Yet I agree with Meade Waldo that the shape of the clypeus is a character important enough to include *R. fuscipennis* in a distinct genus. However, the other generic characters given in the diagnosis seem of little importance. The labial palpi were described as 3-jointed; but, as first pointed out by A. v. Schulthess[1] and as recognized later on by Meade Waldo,[2] there is an evanescent fourth joint. The shape of the second cubital cell, which was originally said to be petiolate, must be variable. In my specimen, which comes from Lourenzo Marques, both intercubital nervures are united on the radius; the second cubital cell can hardly be called petiolate.

I have also seen one female of *Odynerus ferruginatus* J. Bequaert, from Lourenzo Marques. In comparing it with my specimen of *Rhynchalastor fuscipennis,* I find that, although both species are remarkably similar in general shape and coloration, there are many good characters by which they can be separated, even apart from the shape of the clypeus.

A. Schletterer described in 1891,[3] from the Belgian Congo (Equator), an *Odynerus xanthosoma* which undoubtedly belongs in *Rhynchalastor*. This has been shown by Meade Waldo,[4] who was able to study the type specimen. Besides, the pointed shape of the clypeus is accurately figured by Schletterer. I have not yet seen specimens of this *Rhynchalastor xanthosoma* (Schletterer). In comparing the description with my specimen of *R. fuscipennis,* it seems to me that these two forms are closely allied, if not mere synonyms. If this proves to be true, Schletterer's name will claim priority.

Rhynchalastor was thus far only found in the Ethiopian region, and nothing is known of its habits.

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[1] Soc. entomol., XXIX, 1914, p. 73.
[2] Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 501.
[3] Ann. Soc. entom. Belgique, XXXV, 1891, p. 24, Pl. I, fig. 10.
[4] Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 501.

EPIPONINÆ

Belonogaster H. de Saussure

An exhaustive monograph of this genus has been published in recent years by R. du Buysson.[1] The identification of its species is now easy and we can refrain from any remarks concerning its taxonomy.

Belonogaster possesses several remarkable characters. The antennæ are 11-jointed in the female, 12-jointed in the male. The labial palpi are 3-jointed, and the maxillary palpi 5-jointed. The eyes bear very few, scattered, stiff hairs, apparently more abundant in some species than in others. The mesopleura are very simply built: there is no trace of a suture subdividing the episterna or separating the epimera.

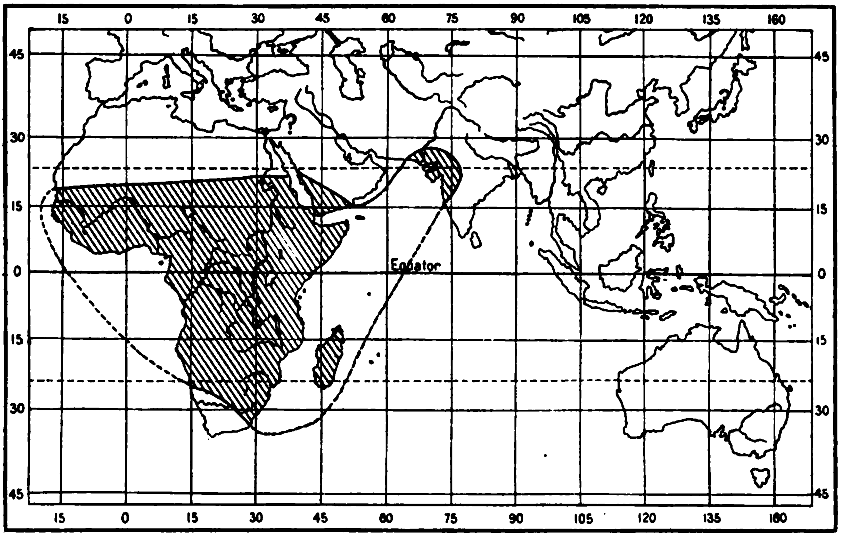

Fig. 237. Distribution of the genus *Belonogaster*.

This genus is practically endemic in the Ethiopian region, including the Malagasy Islands and Southern Arabia (Fig. 237). Only one species, *B. indicus* Saussure, extends from East Africa into British India, and it is also recorded from Judæa and Japan; but the last two localities are somewhat doubtful. In the Central African mountains some species are found as high as 2000 m. Of the 35 species, 9 are restricted to the Malagasy subregion; 2 are only found in Southern Arabia and on Sokotra; 8 are restricted to South and East Africa, one of these, however, extending into the Oriental region; 6 are strictly West African forms; and the remaining 10 species are widely distributed over the continental part of the Ethiopian region.

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[1] Monographie des Vespides du Genre Belonogaster, Ann. Soc. entomol. France, LXXVIII, 2, 1909. pp. 199–270, Pls. II–VII.

Ethology. The life history of *Belonogaster* presents many interesting points, some of which are still but superficially known. The earliest description of its nest is given by F. Smith for *B. junceus* (Fabricius) (= *Raphigaster guineensis* Smith) and for another species erroneously recorded as *Mischocyttarus labiatus.* Both nests were collected by Gueinzius at Port Natal.[1] Brief notes on the nest of *B. junceus* (Fabricius) were also contributed by P. Magretti[2] and A. Tullgren.[3] The first drawings of a *Belonogaster* nest were published in Brehm's Thierleben for an unidentified species from South Africa; later by H. de Saussure for an unidentified species from Madagascar,[4] and by Kirby for *B. saussurei* Kirby from Sokotra.[5] In his Monograph, R. du Buysson gives full details as to the nidification of many species, and he describes also the larva and pupa. Only recently, however, did E. Roubaud publish the first field observations on these insects.[6]

Some species build inside of houses, at the entrance of caves, or under overhanging rocks; others prefer to attach their constructions on or inside of tree trunks, or to the under side of leaves. I once found in a very open bush steppe, at Kabare, near the south shore of Lake Albert Edward, a nest of the common *B. junceus* (Fabricius) placed underground in the upper part of the burrow of a wart-hog, together with a mud nest of a *Pelopæus.*

The nests of *Belonogaster,* like those of *Polistes* and *Ropalidia,* belong to the type called by H. de Saussure[7] "stélocyttare, gymnodome, latérinide." The slightly hexagonal paper cells are alike and form a single layer. There is no cover, the comb hanging completely free and with the opening of its cells directed downwards. As a rule, the nest is fixed to its support by an eccentric pedicel, originating from the basal end of the comb. The base of each new alveolus is much narrower than the top of a completed cell; the cell is built farther and gradually widened at the top as the growth of the larva progresses. This process causes the various alveoli to diverge from each other, producing a strong outward curving of the whole comb. The nest grows very regularly by the addition of new cells to its free extremity. It is never very large, the average number of cells or alveoli being 50 to 60; very seldom a single nest may contain 200 cells or more, but, even then, the construction is not of very great bulk, for these wasps have the curious habit of gnawing away the greater part of the old cells, near the petiole. This old paper is used for new cells at the opposite end of the nest. The material of the nest is a very brittle paper of vegetable fiber; the peduncle and the side parts of the bottom of the nest are much stronger than the walls of the cells.[1]

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[1] Trans. Entom. Soc. London, (2), III, 1856, Proc., p. 129.

[2] Ann. Mus. civ. Genova, XXI, 1884, p. 599.

[3] Ark. f. Zool., I, 1904, p. 453.

[4] Abhand. Senckenberg. naturf. Ges., XXVI, 2, 1900, p. 206, figs. 1 and 2.

[5] Nat. Hist. of Sokotra by H. D. Forbes, Zool., Hym., 1903, p. 248.

[6] C. R. Ac. Sc. Paris, CLI, 1910, pp. 553–556; Ann. Sc. nat. Zool., (10), I, fasc. 1, 1916, pp. 110–139.

[7] Etudes fam. Vesp., II, Vesp., 1853, Introd., p. lv.

Roubaud has discovered many interesting facts with regard to a tachinid fly, *Roubaudia rufescens* Villeneuve, a common parasite in the nest of *Belonogaster*. The female of this fly is viviparous and lays her young larvæ in or on the wasp nests. As a rule, each young larva burrows into a *Belonogaster* egg or into a very young wasp larva, exceptionally into a more advanced larva. The presence of the parasitic fly larva does not, however, prevent the further development of the wasp larva, which manages to spin its cocoon. But after this, the parasite devours entirely the internal organs of its host and finally leaves the integuments of the wasp larva in order to pupate in the bottom of the cell. At about this time, the adult wasps gnaw away the cap of the cell in order to feed on the remains of the destroyed wasp larva. The opening thus formed is the means of escape for the adult fly, which would otherwise finally die inside of the closed alveolus. These parasitic flies are very noxious to the wasps and often their number increases to such an extent that they bring about the destruction of a colony. A minute chalcid fly of the genus *Paracrias* (Eulophinæ), has been found to infect the *Roubaudia* larva inside the wasp larva; it issues subsequently in large numbers from the pupa of the fly.[2]

The *Belonogasters* are true social wasps, but their societies are in either a very primitive or else a rather degenerate condition. This is plainly shown by Roubaud's observations. The most interesting fact discovered by him is *the probable absence of true workers* in the societies of *Belonogaster*: all the females of a same nest are physiologically equal; they can all be fecundated and the ovaries of all of them can produce, sooner or later, mature eggs; differences in size have no relation to the fertility of the individuals. The *Belonogasters* are, therefore, typical *polygynous* wasps. A new nest is, as a rule, started by an isolated female; but very often two or more females may associate to found a new society, the single female which started the nest being joined by other foreign females at an early period of the construction. More often, however, the new nest originates by a sort of rudimentary swarming, a number of females together leaving an old nest in order to start a new one. Yet in large communities there is a primitive division of work between the different females: some of them, as a rule the older ones, devote themselves chiefly to egg laying, whereas others go out hunting and bring the food in. In these working females the activity of the ovaries may be temporarily reduced, even after copulation has actually taken place. Freshly emerged females stay for the first few days on the nest, where they help the others in feeding the larvæ and otherwise caring for the nest. The males also remain on the nest where they live as true parasites, taking a part of the food brought by the working females. These wasps, so far as observed, make no provision of honey.

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[1] Some species have an aberrant nidification: such are *B. brevipetiolatus* Saussure, where the cells are placed on a single row, to form a narrow stripe; and *B. hildebrandti* Saussure where the nest is nearly sessile; both these species inhabit Madagascar.

[2] E. Roubaud.— Evolution et histoire de *Roubaudia rufescens* Villen., Tachinaire parasite des Guêpes sociales d'Afrique, des genres *Icaria* et *Belonogaster*. C. R. Ac. Sc. Paris, CLI, 1910, pp. 956–958.

As in other social wasps, the larvæ are fed by the females from day to day till they are full-grown. The food consists mostly of masticated insects, chiefly caterpillars, which are presented by the females to the larvæ. At this time the larvæ produce a buccal secretion of which the adult wasps, males as well as females, are very fond. Roubaud goes so far as to believe that in many cases the offering of food to the larvæ by the female is conditioned by the desire of the female to provoke this larval secretion in order to feed on it. He sees in this peculiar symbiotic relation between the adults and the larvæ, which he calls "*œcotrophobiosis*," one of the determining factors in the evolution from solitary to social habits among wasps.

Roubaud believes that the societies of *Belonogaster* show very primitive conditions of social life among the Vespidæ. He considers them to be an important stage in the evolution of social habits among wasps. I must confess that I have still some doubts concerning this. The absence of true workers in the societies of *Belonogaster* may as well point to a degenerate condition of social life; certainly the morphology of these wasps is not primitive, but reveals many degenerate characters, such as the reduction of the number of joints in the antennæ and palpi, and the complete fusion of the different plates of mesopleura and mesosternum.

Key to the Congo Species of *Belonogaster*

Although R. du Buysson considerably reduced the number of species described at his time, the limits between some of the species admitted by this author are still very difficult to appreciate. It seems that further reductions will become necessary. The descriptions in du Buysson's Monograph are very accurate; yet it is to be regretted that this author has, for a very large part, based his key to the species on the color markings. It may therefore be useful to give, for the Congo species known to me, a key based upon structural characters, as far as this is possible. The males are, as a rule, much better characterized than the females.

Five species were previously recorded from the Belgian Congo: *brunneus* Ritsema, *griseus* (Fabricius), *junceus* (Fabricius), *sævus* Saussure, and *vasseæ* R. du Buysson. To these we may add now: *dubius* Kohl, *lateritius* Gerstæcker, *pusillus* Kohl, and *turbulentus* Kohl.

The following two species were not in the collection on which this paper is based and it was, therefore, impossible to include them in the key:

B. brunneus Ritsema.— Lower Congo: Banana-Loango[1]; Lukunga, on the river Lukunga[2]; Boma.[3]

B. vasseæ R. du Buysson.— Lufu River.[4]

1. Thorax very distinctly punctate all over, its sculpture becoming coarsely and densely rugose on scutellum and postscutellum; the propodeum transversely striate, distinctly but finely, all over. First abdominal segment (petiole) about as long as the thorax, very gradually thickened from its base to behind its middle, its upper margin forming in profile a continuous, but distinct, curve. Thorax with abundant, erect, black pile, in addition to the appressed tomentum. Hind femora with dense, grayish pubescence beneath; some of the longer hairs blackish. Coloration ferruginous-brown, some parts of the body and legs turning black, especially towards the apex of the abdomen; in the ♂ the face bears two whitish lateral bands descending over the clypeus. Antennæ long and slender; in the ♀, their joints 4, 5, and 6 distinctly longer than broad; in the ♂, the tyloides on the under side very indistinct, the joints 10 and 11 narrow, long, cylindric, the twelfth joint cuneiform, arcuate, with rounded apex. Species of large size. Total length, 25 to 31 mm. *B. sævus* Saussure.

Thorax with much finer and more scattered punctation; the scutellum and postscutellum never rugose; the propodeum at most with a few indistinct striæ on its terminal portion....................................2.

2. ♀.— Very slender insect. Temples narrow, not broader than the eyes on the head as seen in profile; the head distinctly narrowed behind the eyes. Oculo-malar space comparatively short, much shorter than joints 4 plus 5 of the antennæ. Abdominal petiole (first segment) longer than the thorax, slender and linear in its basal two-thirds, distinctly swollen behind its stigmata. The petiolate portion of the second segment very long. Legs, especially their tarsi, very slender. Punctation on head and thorax very scarce and minute, nearly obsolete on temples, clypeus, and mesopleura. The whole body pale ferruginous-brown, often with yellow or white spots on the thorax and on the

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[1] C. Ritsema, Tijdschr. v. Entom., XVII, 1874, p. 202.

[2] R. du Buysson, Ann. Soc. entom. France, LXXVIII, 2, 1909, p. 247.

[3] W. A. Schulz, Hymenopteren Studien, 1905, p. 15 (*B. distinguendus*).

[4] R. du Buysson, Ann. Soc. entom. France, LXXVIII, 2, 1909, p. 220.

apex of the clypeus; wings bright ferruginous-yellow, with a slight golden tinge. Small species; total length, 18 to 22 mm. ♂ unknown.
B. turbulentus Kohl.

Of heavier build. The head scarcely, or not, narrowed behind the eyes, the temples being as broad as or broader than the eyes. Oculo-malar space longer; often as long as joints 4 plus 5 of the antennæ. Abdominal petiole never longer than the thorax, as a rule shorter; gradually thickening from its base to behind its middle. Punctation always distinct on temples, clypeus, and mesopleura..3.

3. ♀.— Third joint of the flagellum slightly longer than broad; the fourth quadrate, not longer than broad; the following joints rather broader than long. Sides of the face with or without white markings. ♂.— Tyloides on the under side of the flagellum not strongly projecting; the terminal joint of the antennæ long, narrow, falciform. Clypeus pointed at its apex. Coloration of both sexes ferruginous, often darkened on the thorax and the posterior half of the abdomen; the abdomen with or without lateral, pale spots. Wings tinged with ferruginous, often with a slight purplish effulgence. Total length, 20 to 25 mm................................*B. lateritius* Gerstæcker.

♀.— Third and fourth joint of the flagellum distinctly longer than broad; the following joints quadrate or even slightly longer than broad. ♂.— Tyloides on the under side of the flagellum strongly projecting; or else species of large size (over 25 mm.)...4.

4. ♀.— A white or yellowish-white longitudinal band on each side of the face, running as a rule from the emargination of the eyes to the apex of the clypeus. Terminal joint of the tarsi often of a brighter color than the other joints....5.

♀.— No white or yellowish markings on the face. The terminal joint of the tarsi of the same color as the others. In the ♂, the clypeus distinctly pointed towards its apex; the antennæ with tyloides on the under side of joints 5 to 11, those on joints 9, 10, and 11 strongly projecting; the terminal joint of the flagellum long, arcuate, broadly rounded at its apex...................6.

5. Small, but heavily built species, 17 to 23 mm. in total length. Thorax and abdomen very often with white or yellow markings. ♂.— Clypeus broadly rounded at its apex; the tyloides strongly projecting on the under side of the antennal joints 9 to 11..............................*B. pusillus* Kohl.

Species of large size, 24 to 33 mm. in total length. Thorax and abdomen never spotted with white or yellow. (♂.— Clypeus longer than broad, with projecting apex; tyloides not projecting on the under side of the antennal joints 9 to 11[1])..*B. dubius* Kohl.

6. Wings entirely dark fuscous, with strong, purple effulgence. Body rather slender. Temples normal; not swollen behind the eyes. First abdominal segment (petiole) slightly shorter than the thorax; very gradually, but distinctly thickened from its base to behind its stigmata. Coloration mostly black; the head, antennæ, sides of the thorax, legs, and abdominal petiole, partly suffused with ferruginous-brown. In some specimens, there is a cuneiform yellowish-white spot on each side, in front of the hind margin of the

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[1] After R. du Buysson, since I have not seen the male of that species.

second tergite. Body covered with grayish pubescence, which is more conspicuous and slightly silvery on the mesonotum. In the ♂, the face has on each side a broad, yellowish-white stripe near the inner margin of the eyes. Total length, 22 to 30 mm........................*B. junceus* (Fabricius).

Wings more or less hyaline, tinged with ferruginous-brown, darker towards their apices. First abdominal segment more slender than in the preceding species, about as long as the thorax. Coloration variable, but as a rule paler, the thorax being ferruginous; very often the abdomen presents a series of lateral, white or yellowish spots on the tergites 2 to 5, those on tergite 2 being much the largest. Pubescence silky, dense, appressed, very distinct on the mesonotum. Total length, 20 to 28 mm..........................*B. griseus* (Fabricius).

89. **Belonogaster sævus** H. de Saussure

Belgian Congo.— Although widely distributed, this species is always very rare. I have seen ♀♀ from Avakubi, October 9, 1909; Bafwabaka, and Medje, January 1914; and 2 ♂♂ from Stanleyville, April 1915 (Lang and Chapin Coll.).

90. **Belonogaster turbulentus** Kohl

Belgian Congo.— Three ♀♀ from Medje, July and August 1910; 3 ♀♀ from Stanleyville, April 1915 (Lang and Chapin Coll.); and 1 ♀ from Lubutu, January 1915 (J. Bequaert Coll.) agree perfectly with the description given by Kohl and R. du Buysson.

The male of this species is unknown. I am inclined to believe that *turbulentus* will prove to be identical with *filiventris* Saussure, a species which has a very wide distribution and differs only by its abdomen being partly black.

91. **Belonogaster pusillus** Kohl

Belgian Congo.— One ♂ and 2 ♀♀ from Garamba, July 1912; and one ♀ from Faradje, March 1912 (Lang and Chapin Coll.).

92. **Belonogaster junceus** (Fabricius)

Plate I, Figure 9

This is by far the most common species of the genus in the Belgian Congo, and apparently everywhere in tropical Africa. In the collection of the Congo Expedition there are numerous male and female specimens from Banana, Zambi, Boma, Matadi, Coquilhatville, Lisala, Basoko, Stanleyville, Risimu, Bagboro, Medje, Niangara, and Faradje.

93. **Belonogaster griseus** (Fabricius)

Belgian Congo.— This species is also widely distributed and scarcely less abundant than *B. junceus* (Fabricius). The collection includes ♂♂ and ♀♀ from Banana, Malela, Matadi, Kinshasa, Isangi, Stanleyville, Medje, Batama, Bafwabaka, Niangara, Garamba, Yakuluku, and Faradje. I have seen it in Mt. Ruwenzori as high as 1800 to 2000 m.

94. **Belonogaster dubius** Kohl

Belgian Congo.— I have seen only females from the following localities: Avakubi, Niangara, Faradje, Yakuluku, and Aba (Lang and Chapin Coll.).

Ethology. Plate VI, Figs. 1 and 2 show a nest of *B. dubius* after photographs made by Mr. H. Lang at Faradje, September 1912. This nest was one of a numerous colony, built underneath the thatching of a roof. In order to photograph it, Mr. Lang removed the nest, with the stick on which it was fixed, outside the house; but the wasps all deserted and went back to the former location of the nest; for about seven hours no wasp would visit the nest. It was then put back in its former position, where all the wasps at once would crawl over it. During the night it was again carefully taken away with the wasps all sleeping. The next day only three of the seven occupants were found on it, and one of these left in the morning to go back to the old location, where three others evidently intended to start a new nest. The notes of Mr. Lang say further: "The wasps sit upon the nests during the day and at night, flying off and coming back to feed their young and to raise the cell walls as the larvæ grow. The building of the cells is done by means of the front legs and mandibles. The vegetable fibers are mixed with saliva and kneaded between the mandibles; from time to time the paste is rolled between the front legs. This process goes on till the fiber paste is of a uniform, soft consistency; then the wasp applies the paper to the cells and models it into the right position and shape, going over and over it again with the mandibles. The adults touch the young with their legs, whereupon the latter at once extend their heads to receive food; at the same time they secrete from the mouth a fluid which is absorbed by the adult wasps. The males also stay on the nest; they are often seen grasping a female, the pair dropping off on the ground during their efforts to copulate, both flying afterwards back to the nest."

Mr. Lang was once staying in a house at Faradje, where several hundred nests, some of which attained five inches in diameter, were attached underneath the rafters and thatching of the roof. One night a caravan of driverants (*Dorylus nigricans*) invaded the house; the ants climbed up under the roof and cleared out all the larvæ, pupæ, and eggs from the nests. In the morning, when the ants had left the place, abundant detritus was lying on the floor. This event was apparently a catastrophy for the colony, very few adults returning to start new nests.

95. **Belonogaster lateritius** Gerstæcker

Belgian Congo.— This species is a typical East African form; its occurrence in the northeastern Belgian Congo is therefore noteworthy. I refer to it 19 ♀♀ and 1 ♂, all from Garamba, June 1912 (Lang and Chapin Coll.).

Ethology. These Garamba specimens were collected from a nest fixed underneath the thatching of a native hut. Mr. Lang records, however, that a nest of the same species was found in the open savannah.

Polybioides R. du Buysson

This genus has recently been proposed by R. du Buysson[1] for a small number of Old World species which were formerly referred to *Polybia* Lepeletier (= *Myrapetra* White[2]), the genotype being *Vespa tabida* Fabricius.

A. v. Schulthess[3] suggests that the name *Parapolybia* Saussure must supersede *Polybioides* R. du Buysson, but I do not believe this to be true. H. de Saussure[4] proposed *Parapolybia,* as a division of his genus *Polybia,* to include the three species: *P. indica* Saussure, *P. orientalis* Saussure, and *P. tabida* (Fabricius); the genotype of *Parapolybia* has never been designated. Since R. du Buysson brings *P. tabida* (Fabricius) in his new genus *Polybioides,* one of the two remaining species must be taken as the type of *Parapolybia* Saussure. R. du Buysson's genus *Stelopolybia*[5] includes both *P. indica* and *P. orientalis,* and is a synonym of *Parapolybia* Saussure; but the identity of *Stelopolybia* R. du Buysson and *Stelopolybia* Ducke is still a matter of dispute.[6]

Polybioides is characterized as follows. Labial palpi 3-jointed and maxillary palpi 5-jointed in both sexes. Antennæ 11-jointed in the female, 12-

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[1] Bull. Soc. entom. France, 1913, p. 299.

[2] *Polybia* Lepeletier, 1836, is preoccupied by *Polybius* Leach, 1816.

[3] Zool. Jahrb. Abt. f. Syst., XXXVII, 1914, p. 261, footnote.

[4] Et. fam. Vesp., II, Vesp., 1853, p. 207.

[5] Bull. Soc. entom. France, 1913, p. 298.

[6] Zool. Jahrb. Abt. f. Syst., XXXVI, 1914, p. 329.

jointed in the male. In these characters it agrees with *Belonogaster;* but it is widely different in the structure of the mesopleura, which present distinct sutures subdividing the episterna and separating the epimera. Also, the first abdominal segment, though distinctly petiole-shaped, is much shorter than in most of the species of *Belonogaster;* the second segment does not form a distinct neck at its base.

I know only the Ethiopian species. In these, the clypeus of both sexes ends in a sharply pointed, dentiform apex. The temples are broad and the oculo-malar spaces long: about as long as the third joint of the flagellum in the female; much shorter in the male. The antennæ of the male are elongate and normal; the different joints of the flagellum, as compared with those of the female, merely longer, scarcely more swollen, without tyloides at their under side. Anterior angles of the pronotum broadly rounded. The structure of scutellum, postscutellum, and propodeum is very similar to that found in *Belonogaster;* at the base of the propodeum, the postscutellum is very feebly expanded into a rounded obtuse angle.

Polybioides at present includes four species, two of which are Ethiopian and only found on the African continent; the remaining two species belong to the Oriental region.

Ethology. What was known thus far on the habits of these insects is restricted to a short description of a nest of *P. tabida* by R. du Buysson. The nests of the two African species consist of a small number of combs placed vertically side by side, one of their ends attached to a branch; the whole is enclosed in a thin, brittle paper cover. More details of these interesting constructions and the behavior of their inhabitants may be found further on (pp. 241 and 243).

The pupa, which I have seen preserved in alcohol, of *P. tabida* (Fabricius) is very similar to the adult wasp. Its vertex is flat, without the conical protuberance so characteristic of the pupæ of *Belonogaster.*

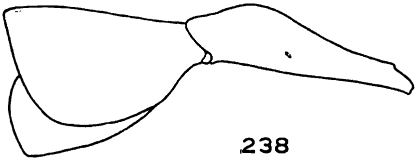
Key to the Congo Species of *Polybioides*

A. v. Schulthess and R. du Buysson accept only one species of *Polybioides* for the Ethiopian region. I believe, however, that *P. melaina* Meade Waldo, although closely allied to *P. tabida* (Fabricius), can be separated even on morphological characters. Morever, the habits of both these forms show many differences.

First abdominal tergite (petiole) longer and more slender; about as long as the thorax and much longer than the second tergite (Fig. 238). Black, with rufous tinges on different parts of the body and legs, and with conspicuous pale yellow markings. Wings nearly hyaline, infuscate along their anterior margin only. Length (h. + th. + t. 1 + 2), ♂ and ♀, 8 to 9.5 mm...*P. tabida* (Fabricius).

First abdominal tergite comparatively shorter and of heavier build; much shorter than the thorax, and only slightly longer than the second tergite (Fig. 239). Black, scantily marked with whitish-yellow. Wings much darkened, smoky all over. Length (h. + th. + t. 1 + 2), ♀, 8 to 9 mm.

P. melaina (G. Meade Waldo).



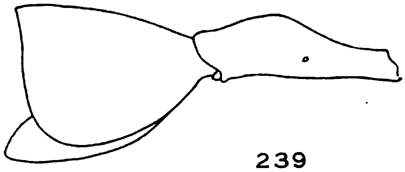


Fig. 238. ***Polybioides tabida*** **(Fabricius), two basal abdominal segments in profile, ♀.**

Fig. 239. ***Polybioides melaina*** **(G. Meade Waldo), two basal abdominal segments in profile, ♀.**

96. **Polybioides tabida** (Fabricius)

Plate I, Figure 7

♀.— Although the coloration is very variable, I have not seen, in my abundant material, specimens which, as to color, would connect *P. tabida* (Fabricius) with *P. melaina* (Meade Waldo). The females from the Congo all belong to the typical form which may be described as follows: The ground color is not pure black but presents a somewhat brownish tinge which often passes to ferruginous spots on the under side of the thorax, on the legs, etc. The following whitish-yellow parts are very striking: the whole of the clypeus; the under half of the emargination of the eyes; the inner orbits between the basis of the antennæ and the clypeus; the temples; the mandibles partly; the posterior margin of the pronotum; broad margins on the scutellum; the postscutellum; the valvula at the apex of the thorax; a broad spot on the middle and a narrower stripe on each side of the propodeum; an indistinct dot in the upper part of the mesepisterna; a broad basal stripe on the second and third abdominal tergites and the whole of the second sternite; the apical half of the femora; and nearly the entire tibiæ of the front and middle legs. In some specimens the yellowish color invades the entire scutellum, nearly the whole of all the tibiæ and of the front and middle femora, and the base of the first tergite. There may be even a narrow, yellow stripe on the anterior face of the antennal scape. The wings are nearly transparent, feebly smoky, somewhat iridescent; with a dark-brown stigma and a slightly darkened anterior margin, especially in their radial cell.

A. v. Schulthess has described from West Africa a variety *isabellina*, ♀: it is entirely yellow with the exception of the vertex, the posterior face of the head, and the abdomen behind the middle of the second tergite, which are black.

♂.— The male of *P. tabida* has apparently never been described. I have seen three specimens of this sex in the collection of the Bussey Institution at Harvard University.[1] They were collected in Cameroon by Thaxter. In coloration they

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[1] I was able to study these specimens thanks to the kindness of Professor C. T. Brues, to whom I wish to express my appreciation for this and many other facilities given to me.

agree almost perfectly with the typical form of the female described above. The yellow of the legs and of the basal segment of the abdomen is slightly more extended, and the ventral face is mostly testaceous. The antennæ show pale brown, somewhat raised, spots on the under side of joints eight to twelve; but these pale swellings are very feeble and cannot be described as tyloides. The last abdominal sternite is normally rounded, scarcely flattened towards its apex, even less so than in the males of *Belonogaster*. Length (h. + th. + t. 1 + 2), 8 mm.

Belgian Congo.— Distributed from the Lower Congo to the Uele district. The collection includes numerous females from Malela, July 1915 (J. Bequaert Coll.), where the species was very abundant in the dense swampy forest along the banks of the Congo River. I have also seen a few females from Medje, April 1914, and one female collected between Bolobo and Lukolela, July 1909 (Lang and Chapin Coll.).

This species is apparently restricted to the forest region of West Africa.

Ethology. All the female specimens of this wasp I have seen are of much the same size. There are no morphological differences between them, and this makes it very probable that this species is polygynous, there being no physiologically differentiated workers. Observations on this point are much needed. New societies of *Polybioides* are probably started through swarming.

The specimens from Medje were taken from a nest which is shown on Plate IV, fig. 2. According to the field notes of Mr. H. Lang, this nest was found in a secondary forest-growth near the station of Medje. It was flattened and elliptic; 108 mm. long and 46 mm. in greatest width; fixed on the stalk of a thorny vine (*Smilax kraussiana*), about 5 feet above the ground and hidden in the dense foliage. Its external cover consisted of a single sheet of very thin, light-gray paper and presented only a single long slit on one side. The two lips of this slit were very close together but in the picture they have been lifted up, in order to show one of the internal combs. On one side of the nest are seen parts of a leaf which was incorporated in the paper cover. Inside were four elliptic combs, fixed by their upper end on the supporting stalk, hanging freely down side by side, and not connected either with each other or with the external paper cover of the nest. The two external of these four combs presented only a single layer of cells opening on the inner side of the comb; but the two central combs, which were larger than the others, had cells on both sides.

It is very interesting to note that these wasps have acquired the habit of utilizing both sides of their combs, thus securing a notable saving of building material and space. This architecture, which is well-known for the honeybee, is quite exceptional among the Vespidæ. The only record of a similar case is, so far as I was able to make out, a nest of the South American *Synœca* *irina* Spinola, described by A. Ducke, in which a supplementary comb showed cells on both sides. According to Ducke, this might have been an abnormal architecture, since only a single one-sided comb was found in other nests of the same species.[1]

The only previous record on the nesting habits of this species is the description of the nest by R. du Buysson for "*P. bucula* (R. du Buysson)," a name which is a synonym of *P. tabida* (Fabricius).[2] This nest was found in the Cameroon; it consisted of six elliptic combs fixed side by side on a branch by one of their ends and parallel to each other. Details as to the disposition of the cells are not given. The whole was enclosed in a cover of pale testaceous, extremely thin carton, of very loose texture. The nest was partly hidden by large leaves connected with its external cover by numerous supports. It was 18 cm. long and 9 cm. wide. Although this nest was larger than the one found by Mr. Lang, it was still much smaller than the nests of the following species (*P. melaina*). This difference in size between the nests of both species is, I believe, constant.

97. **Polybioides melaina** (G. Meade Waldo)

♀.— The coloration of *P. melaina* is less variable in the female than that of *P. tabida*. Most of the specimens are nearly entirely black, this color not turning into brownish; as a rule, only the apical half of the clypeus and a small spot on each side of the face near the insertion of the antennæ are white. In a few individuals, the white covers the temples, the narrow hind margin of the pronotum and two narrow longitudinal stripes on the middle of the propodeum. I have seen only one female from Stanleyville in which the white markings are nearly as extended as in some specimens of *P. tabida*, but the short first tergite and the very dusky wings of that specimen leave no doubt as to its identity.

I was unable to study the male of this species. According to G. Meade Waldo, it differs from the female in having the following parts pale testaceous: clypeus totally, except for a median longitudinal streak reaching almost to the apex; mandibles; the inner margin of the eyes (including the lower portion of their emargination); the intermediate coxæ beneath; and the second abdominal sternite.

Belgian Congo.— There are in the collection several hundred specimens from the following localities: Stanleyville, Bafwabaka, Lubila, and Medje (Lang and Chapin Coll.); Walikale and Rutshuru (J. Bequaert Coll.).

This species, too, is found only in the forest regions of tropical Africa, and it is apparently restricted to the very central parts of the continent. It was first described from Mt. Ruwenzori, where, according to personal observations, it does not reach the temperate mountain zone, not being found above 1500 m. It was also recorded from Rugege (a forest region east of Lake Kivu) and from Mt. Kenia. The present collection shows that it occurs throughout the forest, west of the Great Lakes, as far as Stanleyville and the Uele.

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[1] See A. Ducke, in Bol. Mus. Gœldi, Para, IV, pt. 4, 1906, pp. 672–673; and V, pt. 1, 1908, p. 164, Pl. I, figs. 1a and 1b.

[2] Bull. Soc. entom. France, 1902, p. 253.

Ethology. Plate v, fig. 1, represents a nest of this species found by Mr. H. Lang near Stanleyville. It was built in a tree about 15 feet above the ground, hanging downwards from a branch, close to the water. It was about one and one-half feet long and 14 inches wide, and was somewhat conical, with its broader, transverse base fixed on the support. The outside cover, which completely encloses the nest, consists of several sheets of paper irregularly adjusted so as to leave between them large spaces serving as entrance galleries to the interior of the nest. These galleries end outwardly in rounded openings, which are extremely numerous and scattered all over the nest. All these openings are directed downwards, the paper cover being placed so as to shelter them from the rain; this gives to the outer surface of the nest an undulated or frilled appearance. At the pointed, lower end the openings are larger and closer together. Plate v, fig. 2, shows the same nest after it had been partly destroyed, only half being left. The structure of the cover can be seen on one of the sides. Of the inner structure it can only be said that several somewhat curved combs hang freely downwards from a rather narrow base fixed on the branch. These combs hang side by side, not being connected with each other, nor with the covering. Apparently in this species too, most of the combs are covered with cells on both sides.

From my own experience, and that of Messrs. Lang and Chapin and of others, it appears that the nests of *Polybioides melaina* are very often fixed on branches of trees which overhang the water. This might, however, merely be due to the fact that they are more easily discovered in that location than when built in the higher trees of the dense forest. They are extremely common along the Aruwimi, Ituri, Itimbiri, and the affluents of these rivers in the forest belt; and they are well-known to everyone who has travelled with canoes in that portion of the Congo basin. This wasp does not seem to occur in the forest gallery of the Uele River.

When compared with their larger relatives, *Polistes* and *Belonogaster,* they would seem to be of little importance as pests; yet their large number, their painful sting, and, above all, their offensive temper make them dreaded by both natives and Europeans. Many of their nests are much larger than that figured and described in this paper, some of them reaching three feet in length; they are densely populated and the numerous, broad entrances described above account for the fact that, when touched or disturbed, the nest is almost instantly covered all over with angry wasps, ready to dart at the intruder.

The evil reputation of the *Polybioides* was known even to Stanley, the first white man to invade their haunts and to give us a vivid picture of their nests: "These widely spreading trees (on the edge of the Aruwimi River) are favorites with the black wasps, to which they attach their pensile nests. Externally the nests are like fancifully cut brown-paper sacks, or a series of such sacks arranged one above another, with frills and ornate cuttings, like the fancy paper grate-covers in English parlours in summer time. We avoided such trees religiously, and when there was no such terror as a big nest of wasps near, we could rest in comfort and examine the forest at leisure."[1]

These wasps are very fond of meat, coming inside houses to steal pieces of it; they feed also on ripe bananas and are often seen on flowers. It is possible that they store honey in some of their cells, although I can give no definite information regarding this.

ROPALIDIINÆ

Ropalidia Guérin-Meneville

(= *Icaria* H. de Saussure)

The replacing of the well-known name *Icaria* by the older *Ropalidia,* is one of those unfortunate changes which are too often a result of the strict appliance of priority rules. In the present case, however, it seems to be inevitable. Guérin-Meneville figured and named *Ropalidia maculiventris* for the first time in the Atlas of Duperrey's 'Voyage de la Coquille,' Zoologie, Insectes, Plate IX, fig. 8. This Atlas was published long before the text was printed and its publication lasted several years. However, there can, I believe, be no doubt as to the date of publication of the plate in question, since that date is given by Guérin himself in the text of Duperrey's 'Voyage de la Coquille,' Zool., II, 2^{e} p., 1ère div., p. 271, where we learn in the footnote that "Livraison 27" with Plates IX and X of the insects, appeared December 22, 1831.

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[1] 'In Darkest Africa.' New York, 1890. Vol. I, pp. 163–164 and Vol. II, p. 84. H. de Saussure supposed that the wasps recorded by Stanley belonged to *Ropalidia* or *Belonogaster* (in Grandidier, Hist. de Madagascar, XX, pt. 1, Hym., 1890, p. 102, footnote); but the presence of a papery cover around the nests excludes at once these two genera. There can be hardly any doubt that the black wasp found by Stanley on the Aruwimi River belonged to *Polybioides melaina* (Meade Waldo), since we have had frequent opportunities to observe these nests in the same location.

The publication of the figure and name of *Ropalidia maculiventris* in the Atlas establishes the genus in due form; hence it is obvious that Lepeletier de St. Fargeau's generic name *Rhopalidia* (1836)[1] can make no claim to priority. It is well known that *Rhopalidia* Lepeletier and *Ropalidia* Guérin include completely different insects,[2] although Guérin believed them to be the same and in the text of Duperrey's work quotes Lepeletier as the author of the genus.[3] It is probable that Guérin was mislead by the similitude of names and that Lepeletier de St. Fargeau did not know of the earlier *Ropalidia* Guérin.

H. de Saussure[4] recognized the differences between Guérin's and Lepeletier's genera and, deceived by Guérin's own statements, he proposed the new name *Icaria* for *Rhopalidia* Guérin, 1838. However, *Icaria* H. de Saussure, 1853, and *Ropalidia* Guérin, 1831, are exactly synonymous, both having the same species, *maculiventris* Guérin, 1831, as genotype.

Dalla Torre[5] quotes: "*Rhopalidia* Guérin, Duperrey, Voy. Coquille, Zool., II, 2, 1830, p. 265 (nec Lep.)" as a synonym of *Icaria;* but the date, 1830, is certainly wrong; the error may have originated from the title-page of Duperrey's work, which on Tome second, 2^e partie, shows as date of publication the year 1830. However, it is certain that the text was printed much later; probably its publication lasted several years. It seems impossible to decide the precise date of issue of the pages containing the description of "*Rhopalidia maculiventris*"; so much is sure that it was after 1836, since Guérin quotes Lepeletier's book published that year. The "Avant-propos" to the "Tome second, 2^e partie" was written by Guérin-Menéville and dated 1838, which year may perhaps be accepted as the most probable date of publication of the description of *Rh. maculiventris*.[6] The whole question is of little importance, since we know with precision that *Ropalidia maculiventris* Guérin was figured and named in the Atlas in 1831.

The morphological characters of the genus *Ropalidia* Guérin are as follows:

Antennæ 12-jointed in the female; 13-jointed in the male. Labial palpi 4-jointed; maxillary palpi 6-jointed. Eyes bare or covered with scattered, short, erect hairs. No median episternal groove on the mesopleura, the episternum not being divided into an upper and a lower plate; the mesopleural suture delimiting

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[1] Hist. nat. Ins. Hym., I, p. 538.

[2] *Rhopalidia* Lepeletier de St. Fargeau, 1836 is a synonym of *Gymnopolybia* A. Ducke, Zool. Jahrb. Abt. f. Syst., XXXVI, 1914, pp. 317 and 327.

[3] Duperrey, 'Voyage de la Coquille,' Zoologie, II, 2^e partie, 1ère division, 1838, p. 266.

[4] Et. fam. Vesp., II, Vesp., 1853, p. 22.

[5] Cat., IX, Vesp., 1894, p. 117.

[6] According to W. A. Schulz (Berliner entom. Zeitschr., LVII, 1912, p. 60), *Rhopalidia* Guérin dates from 1839.

the epimerum also indistinct or absent. The shape and structure of the second segment of the abdomen are very peculiar, and I have not found anything similar in another genus of Vespidæ: its tergite and sternite are completely or almost completely fused; very often there is no trace of suture left; or there may be an indication of a suture on one or on both sides of the segment, throughout its length or at its base only, this being somewhat variable in different specimens of the same species. This fusion of tergite and sternite gives to the second segment the shape of a more or less elongated bell, inside which the much narrower and shorter posterior segments can partly or nearly entirely be telescoped. First abdominal segment much narrower than the second; more or less petiolate at its base; curved and swollen in its apical portion.

About 130 species have been described, but it will be difficult to hold these numerous names on morphological characters. The color markings are without any value in this genus, being as variable as in *Polistes*. H. de Saussure[1] has proposed to divide these numerous forms into three groups, which have been named by Dalla Torre[2]; G. Meade Waldo[3] raising them even to subgeneric rank. They are chiefly based on the shape of the abdomen:

1. *Icaria* Saussure, *sensu stricto* (= *Icariastrum* Dalla Torre).— Facies of certain species of "*Polybia*," in the sense of H. de Saussure, 1853; such species are *Protonectarina sylveibæ* (Saussure) and *Myrapetra sericea* (Olivier). Second abdominal segment broad, short, flattened, broader than long. Petiole flattened or cupuliform at its apex. Head flattened and broad. Type: *Ropalidia maculiventris* Guérin. All the species of this group belong to the Oriental and Australian regions.

2. *Icarielia* Dalla Torre.— Petiole campanulate or linear; the second abdominal segment nearly vertically truncate or cut obliquely from behind towards its anterior part. The type is *Icaria flavopicta* Smith, from Borneo. These species belong mostly to the Oriental and Australian regions; but H. de Saussure includes in this group *Icaria phalansterica* Saussure, from Madagascar.

3. *Icariola* Dalla Torre (= *Icaria*, *proprie dicta*, H. de Saussure).— Second abdominal segment longer than broad, of the shape of a cylindric bell, obliquely or vertically truncate from behind towards its anterior part; the third segment strongly retracted within the second. Head of heavy build, not broader than the thorax. Petiole ending in a nodular swelling. The type is *Icaria gregaria* Saussure. This group includes most of the Ethiopian species, and some others from the Oriental and Australian regions.

I cannot believe that these three groups, as they were characterized by

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[1] Stettiner entom. Zeitg., XXIII, 1862, pp. 132–133.

[2] Genera Insectorum, Vespidæ, 1904, p. 72.

[3] Ann. Mag. Nat. Hist., (8), XI, 1913, p. 46.

H. de Saussure, can claim subgeneric rank, because there are intermediate forms in every direction. The shape of the second segment is apparently somewhat variable among the individuals of the same species, taken from a single nest; it depends largely on the more or less complete fusion of its tergite and sternite.

The species of *Ropalidia* may perhaps form three natural divisions as follows:

1. First abdominal segment shortly pedunculate; broadened and gradually rounded towards its apex, which has about the half of the width of the second segment. Second segment short and bell-shaped, about as broad as long; the third and following segments only slightly narrowed and only partly retractile within the second. Mesopleura without raised vertical carina in their anterior part. This group may be called *Ropalidia* Guérin, *sensu stricto*, its type being *R. maculiventris* Guérin, of which I have seen one female; *Icaria australis* Saussure is very probably a synonym of that species.

2. First abdominal segment shortly, or very distinctly, pedunculate; narrowed and swollen; more or less club-shaped at its apex, which has at most one-third of the width of the second segment. Second segment elongate and bell-shaped, with more or less parallel sides; as a rule longer than broad.

> *a*) Mesopleura without raised vertical carina in their anterior part. Type: *Icaria socialistica* Saussure. In this division come all the Malagasy species known to me: *R. atra* (Saussure), *R. hova* (Saussure), *R. phalansterica* (Saussure), *R. grandidieri* (Saussure), and *R. anarchica* (Saussure). Furthermore, the Australian species: *R. socialistica* (Saussure) and *R. cabeti* (Saussure). It is probable that *R. flavopicta* (Smith) also belongs here, so that the name *Icarielia* Dalla Torre might perhaps be used for this group, if we accept it as a subgenus.
>
> *b*) Mesopleura with a raised vertical carina in their anterior part. This carina can become more or less obsolete, according to the state of preservation of the specimens. Type: *Epipona cincta* Lepeletier. The group includes, among the Ethiopian species: *R. cincta* (Lepeletier), *R. guttatipennis* (Saussure), and *R. ambigua* (Gribodo). It also includes the following forms from the Oriental region: *R. artifex* (Saussure), *R. ferruginea* (Saussure), and *R. variegata* (Smith).

Other useful characters to separate the species are afforded by the size of the temples and oculo-malar space, by the shape of the thorax, by the sculpture of the scutellum and propodeum, by the shape of the first abdominal segment; and by the antennæ in both sexes. The shape of the first abdominal segment (petiole) has been very thoroughly studied for the Malagasy species by H. de Saussure[1]: however, it seems that this character does not allow a natural division of the genus, as the extreme forms are in every direction connected with each other. The shape of the terminal margin of the second segment is apparently of little value, showing often much variability in specimens taken from a single nest.

Ropalidia is restricted to the Old World and only found in the Ethiopian, Oriental, and Australian regions (Fig. 240). Forty-one species have been recorded from the Ethiopian region, a number which is doubtless too high. Of these, 29 are only found in the Malagasy subregion. The abundance of *Ropalidia* on Madagascar and the leaf-green color markings peculiar to certain of the Malagasy species,[2] are among the chief features of the wasp fauna of that island. The remaining 12 species are found on the African continent, south of the tropic of Cancer and in Southern Arabia; however, since most of them are very imperfectly known, it is impossible to divide them further into East and West African forms. In the mountains of Central Africa they are found as high as 2000 m.

Ethology. The nest of *Ropalidia* was known to H. de Saussure, who described and figured it for several Oriental species.[3] It is composed of a single horizontal or convex comb of hexagonal paper cells, not enclosed in a cover; the nest hangs from a roof, a branch, or a leaf, the opening of the cells being directed downward. The pedicel is situated either in the center or at one of the extremities of the comb. The comb itself may be very long and narrow, or broader, oval; in the latter case, which is more frequent on the African continent, the nest is very similar to that of *Polistes*.

The nest of the African *R. guttatipennis* (Saussure) has been described by F. Smith,[4] and a few details of the life history of *R. cincta* (Lepeletier) and *R. guttatipennis* (Saussure) have been recently given by Roubaud.[5] All the cells of a nest are of the same size and shape; the colonies are, as a rule, more numerous than in *Polistes* and the nest may consist of several hundred cells. Associations of females in order to start a new nest have been observed; still, there is a differentiation between sterile females (workers) and fertile females (queens), as was found after an anatomical study of the ovaries. There are always a number of fertile females on the same nest, so that the societies of *Ropalidia* are still polygynous, though presenting less primitive conditions than the communities of *Belonogaster*. The larvæ are fed after the manner of *Belonogaster* with animal food, mostly with malaxated caterpillars. Storing of honey in the cells has not been observed.

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[1] In Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 111–115.

[2] Several of the Malagasy *Belonogaster* present also leaf-green color markings (*B. prasinus* Saussure, *B. apicalis* Saussure, etc.).

[3] Et. fam. Vesp., II, Vesp., 1853, pp. LXI and 26; Pl. IV, fig. 3a; Stettin. ent. Zeitg., XXIII, 1862, p. 139.

[4] Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 129.

[5] Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 139–141.

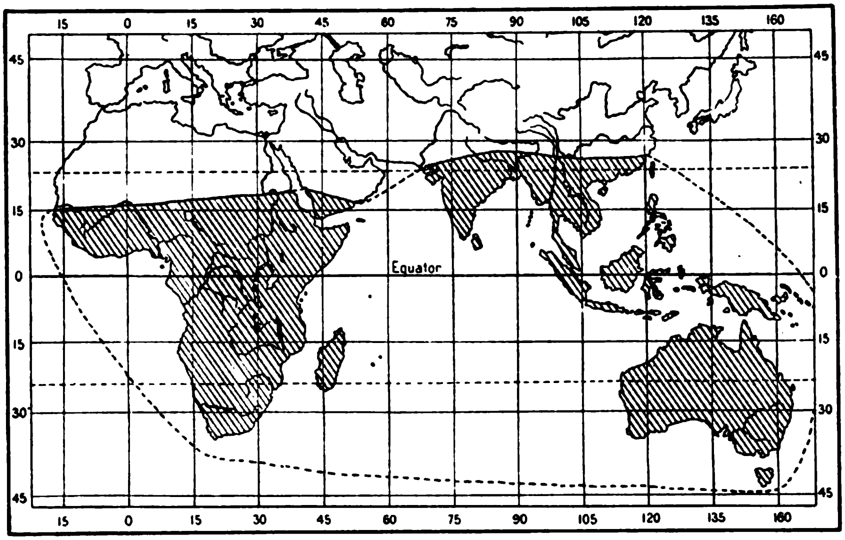


Fig. 240. **Distribution of the genus *Ropalidia*.**

Key to the Congo Species of *Ropalidia*

Only one species, *R. cincta* (Lepeletier), had been hitherto recorded from the Belgian Congo. Besides this very common wasp, the collection contains also specimens of *R. capensis* (Saussure) and *R. guttatipennis* (Saussure). These three species may be separated as follows:

1. First abdominal segment short and swollen; its petiolate base scarcely distinct (Fig. 242). Thorax elongate, more than one and one-half times as long as broad, as seen from above. Scutellum without raised median anterior carina; with a shallow longitudinal furrow on its middle. Propodeum without any trace of longitudinal ridges or posterior projecting angles; its sides rounded and convex. Antennæ short; clavate (Fig. 241). Posterior ocelli scarcely more distant from the inner margin of the eyes than from each other. Length (h. + th. + t. 1 + 2), ♀, 7.5 mm. . . . . *R. capensis* (Saussure).

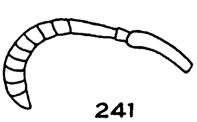
   First abdominal segment more elongate and slender; with a very distinct, basal petiole (Figs. 243 and 246). Thorax only slightly longer than broad as seen from above; the swollen mesopleura, as a rule, visible from above at the sides of the tegulæ. Scutellum with a more or less distinct, raised, median carina. Antennæ more elongate. Posterior ocelli distinctly nearer to each other than to the inner margin of the eyes. . . . . 2.

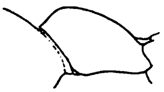
2. Excavation of the propodeum (Fig. 246) shallow; bordered by rounded ridges, which do not project as sharp angles above the insertion of the abdomen. Antennæ, ♀, Fig. 247; ♂, Fig. 248. Length (h. + th. + t. 1 + 2) ♀ and ♂, 8.5 to 11 mm. . . . . *R. cincta* (Lepeletier).

Excavation of the propodeum deep; bordered by strong, subcarinate ridges, which in their lower end project as distinct obtuse angles (Fig. 243) above the base of the abdomen. Antennæ, ♀, Fig. 244; ♂, Fig. 245. Length (h. + th. + t. 1 + 2) ♀ and ♂, 10.5 to 12 mm. . . . . *R. guttatipennis* (Saussure).

98. **Ropalidia capensis** (Saussure)

This species is well characterized by the morphological peculiarities given in the key. The coloration of the only specimen I have seen is ferruginous-black all over. The anterior margin of the clypeus, a spot on each side of the face near the insertion of the antennæ, the narrow anterior carina-shaped margin of the pronotum, two lateral spots on the postscutellum, and the anterior face of the front coxæ, are yellow.





Figs. 241–242. *Ropalidia capensis* (Saussure).

Fig. 241. Antenna, ♀. Fig. 242. First abdominal segment in profile, ♀.

It is, I believe, almost certain that *R. ambigua* (Gribodo) is a synonym of *R. capensis* (Saussure).

Belgian Congo.— A single female from Boma, June 15, 1915 (Lang and Chapin Coll.).

The nest of *R. ambigua* (Gribodo) has been described by R. du Buysson.[1] It is apparently always small.

99. **Ropalidia guttatipennis** (H. de Saussure)

Plate I, Figure 11

This species is very closely related to *R. cincta* (Lepeletier), the only differences being those given in the key; the coloration is, of course, very variable. *R. politica* (Saussure) is merely a color variation of this species, and I am inclined to believe that *R. nobilis* (Gerstæcker) and *R. brazzai* (R. du Buysson) are also synonyms of it. The longitudinal carinæ on the propodeum are more or less marked, and the same is true for its projecting posterior angles. It is sometimes hard to decide whether a female belongs either to *cincta* or to *guttatipennis;* but the males are easily recognized by the shape of the antennæ.

Belgian Congo.— Apparently not very common. I have seen specimens only from Stanleyville, April 1915 (9 ♀♀, 9 ♂♂); Malela, July 1915 (1 ♀); and Katala (1 ♀) (Lang and Chapin Coll.).

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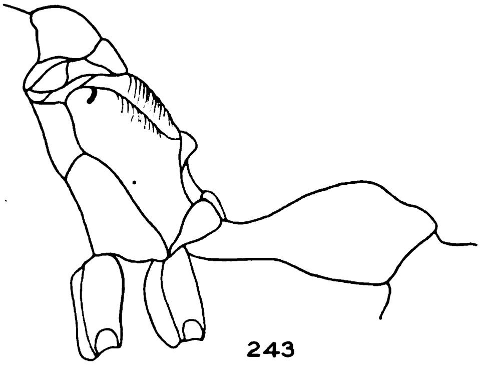
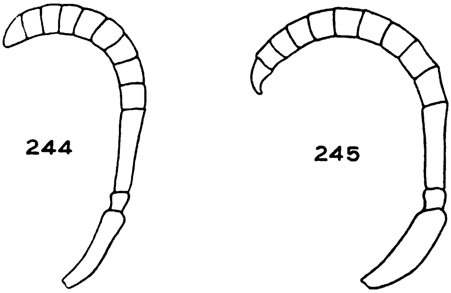
[1] Voyage Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, pp. 155–156.

R. guttatipennis is known all over the Ethiopian part of the African continent, and is said to occur also in the Oriental region. However, I believe that it was often confused with *R. cincta* Lepeletier, which is much more common in Africa.





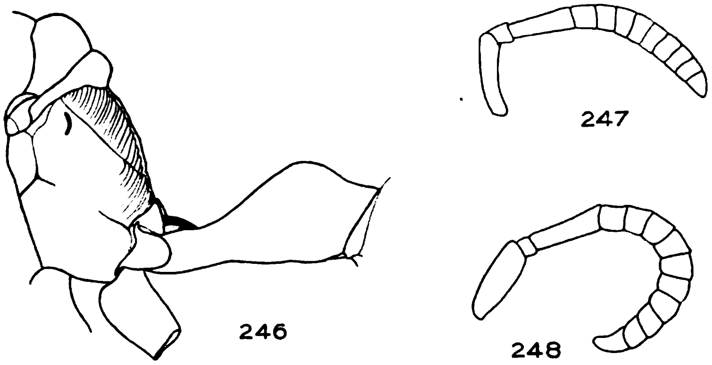
Figs. 243–245. ***Ropalidia guttatipennis*** **(Saussure).**

Fig. 243. Propodeum and first abdominal segment in profile, ♀. Fig. 244. Antenna, ♀. Fig. 245. Antenna, ♂.

100. **Ropalidia cincta** (Lepeletier)

I. tricinctella Gribodo is certainly a synonym of *R. cincta;* the characters given by Gribodo for his species have hardly any value. The carina on the scutellum is said to be very fine, but this is somewhat variable among specimens taken on the same nest; and the obsolete carinæ of the propodeum are characteristic for *cincta.*

Belgian Congo.— One of the most common wasps. I have seen several hundred females and males from Banana, Zambi, Boma, Matadi, Thysville, Stanleyville, Faradje, and Garamba (Lang and Chapin Coll.); Walikale and Bogoro (J. Bequaert Coll.).



Figs. 246–248. *Ropalidia cincta* (Lepeletier).

Fig. 246. Propodeum and first abdominal segment in profile, ♀. Fig. 247. Antenna, ♀. Fig. 248. Antenna, ♂.

POLISTINÆ

Polistes Latreille

The color varies in this genus to such an extent that the markings presented by a specimen are almost without value for its exact identification. Since most of the species have been described on the color alone, there is an abundance of names; whereas the really distinct species are apparently not very numerous. In South America, e. g., Ducke does not recognize more than 19 species.[1] It will therefore be well to show that there are many valuable morphological characters which, when thoroughly studied, will enable us to separate the species and to arrange them according to their natural affinities.

Various attempts to divide the genus *Polistes* into natural groups have not been successful so far. H. de Saussure attached much importance to the general shape of the abdomen, bringing the species in three groups according to this character.[2]

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[1] Bol. Mus. Paraense, V, 1, 1908, pp. 190–198.

[2] Note sur les Polistes américains. Ann. Soc. entom. France, (3), V. 1857, pp. 309–314.

1. Abdomen slender, distinctly fusiform, very conical; its first segment elongate, its apical segments compressed. The abdomen as a whole not depressed. The propodeum conical, rather elongate. Type: *P. canadensis* (Linné).

2. Abdomen of intermediate shape, rather depressed, though compressed towards its apex. Type: *P. carnifex* (Fabricius).

3. Abdomen more oval, less conical, not at all compressed, as a rule slightly curved towards its under side; first segment rather ampulliform; the abdomen as a whole being depressed. Propodeum more flattened, less elongate behind. Type: *P. fuscatus* (Fabricius).

None of the subsequent writers have followed H. de Saussure in this direction. There is evidently a marked difference in the shape of the abdomen between such extremes as *P. canadensis* (Linné) and *P. fuscatus* (Fabricius); but, as pointed out by J. Bréthes,[1] there are numerous transitions. Moreover, the shape of the abdomen often depends upon the state of preservation of the specimens. The shape of the first abdominal segment affords a hardly more reliable character; in some species such as the genotype, *P. gallicus* (Linné), it is short and somewhat bell-shaped; as seen from above, its swollen part is distinctly broader at its apex than long; in profile, it raises abruptly from its basal, short pedicel. In others, such as *P. canadensis* (Linné), this first segment is elongate, about as long as broad at its apex and is gradually swollen behind its short peduncle-like base.[2] But for this, again, there are many transitional forms.

J. Bréthes [3] and A. Ducke [4] have called attention to the different structure of the mesopleura in *Polistes*, which affords very useful specific characters. If we consider the thorax of the type species,[5] *P. gallicus* (Linné), in profile (Fig. 249) we find in the upper part of the mesopleura a vertical median suture (*ab*), which bifurcates above its middle, sending a branch to the front (*bc*) and another to the hind margin (*bd*) of the pleurum. Among the three plates thus separated on the mesopleurum, the upper hind-plate (between the hind margin and the *mesopleural suture, abd*) is the *epimerum* (*em*) of the mesothorax; the rest of the mesopleurum represents the *episternum* divided by a *median episternal groove* (*bc*) in an upper (*es1*) and a lower (*es2*) episternal plate. The lower episternal plate is not separated by a distinct sternopleural suture from the mesosternum; only on its anterior part can we discover a very slight and short longitudinal depressed line (*e*); this depressed line is present, not only in all the species of *Polistes*, but also in most, if not all, of the Vespidæ[1] and it probably represents the sternopleural suture which is still found between mesosternum and mesopleurum in many of the Tenthredinoidea. We find, furthermore, on the anterior part of the lower episternal plate a more or less distinct ridge (*fg*) often bordered by a suture, running almost vertically from the mesosternum to near the median episternal groove. This vertical ridge may be called the *prepectal suture*, since it delimits on the anterior face of the mesopleura a *prepectus* (Snodgrass) or *epicnemium* (C. G. Thomson; F. Kohl): this is a more or less pronounced depression in which the femora of the front legs can be folded at rest (*ep*).

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[1] An. Mus. Nac. Buenos Aires, (3), II, 1903, p. 17.

[2] An extreme in this direction is *P. subsericeus* Saussure.

[3] An. Mus. Nac. Buenos Aires, (3), II, 1903, pp. 17–27.

[4] Bol. Mus. Paraense, IV, fasc. 2–3, 1904, pp. 364–372.

[5] For the nomenclature of the different parts of the mesopleura, I have followed R. E. Snodgrass. The Thorax of the Hymenoptera. Proc. U. S. Nat. Museum, XXXIX, No. 1774, 1910, pp. 37–91. 16 pls.

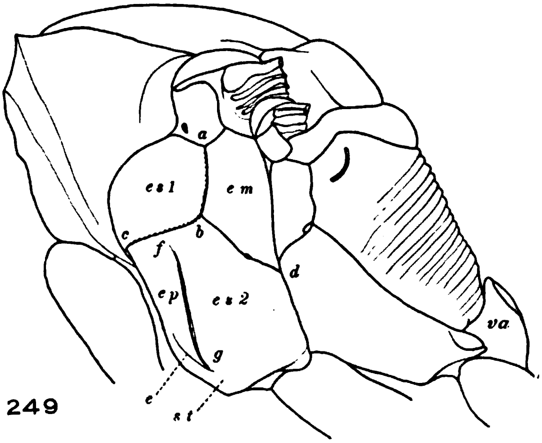

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Fig. 249. *Polistes gallicus* (Linné), thorax, ♀, in profile: *abd*, mesopleural suture; *bc*, median episternal groove; *e*, depressed line representing the sternopleural suture; *fg*, prepectal or epicnemial suture; *st*, mesosternum; *es 1*, upper and *es 2*, lower plate of the mesepisternum; *em*, mesepimerum; *ep*, prepectus or epicnemium; *va*, valvula.

There is much variation within the limits of the genus *Polistes* as regards the relative development of the sutures on the mesopleura. The following combinations may be found:

1. Type of *P. gallicus* (Linné), as described above (Fig. 249): Mesopleural suture, median episternal groove, and prepectal suture all well developed. Numerous species, distributed all over the world, come in this group.
2. Type of *P. canadensis* (Linné): Mesopleural suture and median

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[1] This line is very often obsolete in poorly preserved specimens.

episternal groove distinct. No prepectal suture in front of the mesepisternum. Most of the Nearctic and some of the Neotropical species belong in this group.

3. Type of *P. bicolor* Lepeletier: Prepectal suture distinct. Mesopleural suture more or less complete, separating the epimerum from the mesepisternum. No median episternal groove dividing the mesepisternum into two parts. This group includes numerous species of the Neotropical and Oriental regions.

4. Type of *P. madecassus* Saussure: No prepectal suture and no median episternal groove. The mesopleural suture may be more or less complete or become obsolete. In this group belong many Ethiopian and Oriental species and most of those inhabiting the Malagasy subregion.

Gyrostoma schach (Fabricius) (= *Polistes gyrostoma* Saussure, *Gyrostoma orientalis* Kirby) differs from all other species of *Polistes* in having no median episternal groove dividing the mesepisternum into two plates, whereas the prepectal suture of the mesepisternum is strongly marked. This species presents many other morphological peculiarities, so that it is sufficiently isolated from the other *Polistes* to regard it as the type of a distinct genus.

The same cannot be said for the other groups of *Polistes* which have been proposed and named either as subgenera or as genera. Cameron's genus *Polistratus*,[1] e. g., is very doubtful; the type species may be a *Ropalidia* or *Parapolybia* or even a solitary wasp. *Polistella* Ashmead,[2] based on a single species, *Polistes manillensis* Saussure, is very unsatisfactorily characterized. A smooth, not transversely striate propodeum is given as its chief character; but this is found in many species of *Polistes*, even in South America.[3] The venation of the wings is hardly of any value among Vespidæ. The best characters of *Polistella* seem to be the shape of the first abdominal segment, the short oculo-malar space, and its very small size.

Dalla Torre[4] has introduced two new denominations for the groups distinguished by H. de Saussure in his Monograph (1853), merely translating the characters given by this author. *Eupolistes* Dalla Torre corresponds to the "Première division" of de Saussure (*op. cit.*, p. 45, including with a single exception all the species known to him at that time). *Polistoides* Dalla Torre[5] is the "Seconde division" of de Saussure (*op. cit.*, p. 100), with one species *P. subsericeus* Saussure. These divisions were based on the shape of the abdomen, which is apparently too variable to be of any use in bringing the species into natural groups.

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[1] Nova Guinea, V, Zool., 1, 1906, p. 59.

[2] Proc. U. S. Nat. Mus., XXVIII, No. 1387, 1904, p. 133.

[3] G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VII, 1911, p. 102, says that *Polistes flavobilineata* (Cameron) (= *Icaria flavobilineata* Cameron, 1902) is very closely related to *P. manillensis* Saussure: "both species have the median segment only indistinctly transversely striate on the posterior slope."

[4] Genera Insectorum, Vespidæ, 1904, p. 68.

[5] This name is preoccupied by *Polistoides* Loew, 1873.

R. du Buysson[1] has discovered an excellent character presented by some species in the strongly asymmetric tarsal claws of the middle and hind legs, the internal claw being much longer and more heavily built. The species in which this has been found hitherto are: *P. madecassus* Saussure, *P. fastidiosus* Saussure with its var. *sikoræ* (Saussure), and *P. aquilinus* R. de Buysson; they all belong to the Ethiopian region, including the Malagasy subregion, and apparently form a well defined group, which may perhaps claim subgeneric rank. In these three species the terminal tarsal joint of the hind legs is very long and distinctly curved downwards; seen from above, this joint is as long as, or even longer than, the preceding two together; this results from the penultimate joint being shortened on its middle part and deeply bifid at its apex, with very long lateral lobes. The mesopleura present the simplified structure described above for *P. madecassus* Saussure. The propodeum is very strongly, transversely striate. First abdominal segment short; bell-shaped; of the type of *P. gallicus* (Linné).— In the male, the clypeus is truncate; straight along its anterior margin. The antennal joints are cylindrical; elongate; with strongly projecting tyloides beneath. Terminal sternite with a broad oval, median, somewhat discolored depression.

The following structural characters may also be used to separate the species of *Polistes*, chiefly in the males[2]: The development of the temples and of the oculo-malar space; the shape of the clypeus, especially of its anterior margin; the relative distance between the eyes on vertex and clypeus; the shape of the antennæ, especially the form of their apical joint in the male, and the relative length of their joints in both sexes; the sculpture of the thorax, especially of the propodeum, which may be more or less depressed on its middle line; and the shape of the terminal sternite and of the male genitalia.

The genus *Polistes* is distributed all over the world, going as far north as Southern Scandinavia and Canada. Of the 20 species which have been described from the Ethiopian region, 7 are found in the Malagasy subregion, one of these being a local race of a species from the African continent and another being widely distributed throughout the Oriental region; 4 are restricted to West Africa; 6 were recorded only from East and South Africa; and 4 are apparently distributed over the whole continental part of the Ethiopian region.

Ethology. The nesting habits of *Polistes* are well known and are much the same for all the species. The nest is a single horizontal comb of hexagonal paper cells, fixed on the support by a pedicel which, as a rule, has a central situation. In a few species the pedicel is always eccentric. The cells usually open downwards, although in a well sheltered place they may open upwards. The comb is never enclosed in a cover.

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[1] Bull. Soc. entom. France, 1895, p. 256.

[2] F. Kohl, Ann. naturh. Hofmus. Wien, XIII, 1898, pp. 87–90; Denkschr. k. Akad. Wiss. Wien, math. naturw. Kl., LXXXI, 1908, p. 311.

The societies of *Polistes* last, as a rule, only a few months; they are apparently never perennial. The new nest may be, even in tropical countries, started by a single fecundated female or queen; however, it has been repeatedly observed that several females associate to build a new nest: for *P. gallicus* (Linné) by P. Marchal[1] and Ferton[2]; for *P. versicolor* (Fabricius) by H. v. Ihering.[3] Besides, it is very difficult to make a distinction between females and workers, for they can apparently all become fertile.[4] This genus forms a link between the true monogynous (*Vespa*) and the polygynous, swarming wasps (*Apoica, Caba, Chartergus*, etc.). True swarming has not been observed in *Polistes*.

Polistes feeds its larvæ chiefly with animal food (malaxated insects, etc.). All the species probably store in their cells, at least under certain conditions, small provisions of honey. This has been first recorded for *P. gallicus* (Linné) by Lepeletier[5] and later for the same species by Rouget[6] and P. Marchal (*loc. cit.*, 1896). Honey has also been found in the cells of *P. americanus* (Fabricius) from Lower California[7] and *P. metricus* Say from the Eastern United States.[8]

Key to the Congo Species of *Polistes*

Only the following three species of *Polistes* were formerly known to occur in the Belgian Congo: *P. marginalis* (Fabricius), *P. smithii* Saussure, and *P. spilophorus* Schletterer. Besides these I have now seen from the same region specimens of *P. aquilinus* R. du Buysson, *P. haugi* R. du Buysson, *P. fastidiosus* Saussure, and also a species which is apparently new and will be described as *P. macrocephalus*.

1. Tarsal claws of the middle and hind legs asymmetrical, the internal claw much longer and heavier than the external one; for other characters of this group, see p. 256. (Group of *P. madecassus* Saussure)........................2.
   Tarsal claws symmetrical, the internal and external ones nearly alike........3.

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[1] Bull. Soc. zoolog. France, XXI, 1896, pp. 15–21.

[2] Ann. Soc. ent. France, LXX, 1901, 1, p. 128.

[3] Zoolog. Anzeiger, XIX, 1896, pp. 449–453.

[4] Parthenogenesis in *Polistes* has been studied by v. Siebold. Beiträge zur Parthenogenesis der Arthropoden, Leipzig, 1871; Ueber Parthenogenesis bei *Polistes gallica*, Munich, 1869.

[5] Hist. nat. Ins. Hymén., I, 1836, p. 496.

[6] Mém. Ac. Dijon, 1872–1873, p. 37.

[7] Ch. Brongniart, in Bull. Muséum Paris, I, 1895, pp. 37–38.

[8] Wm. M. Wheeler, American Journ. Psychology, XIX, 1908, p. 5.

2. Claws of the hind tarsi very strongly asymmetrical, the internal claw nearly twice as long as the external; the apical tarsal joint strongly curved (Fig. 252). Punctation of head and thorax strong and dense, the mesonotum distinctly rugose. Clypeus convexly swollen, with a few strong punctures scattered all over. Shape of head, ♀: Fig. 250; of basal joints of antennæ, ♀: Fig. 251; of antennæ, ♂: Fig. 254. Black-brown wasp; with a few ferruginous-red spots on head, thorax, and legs; small yellow markings on the thorax, and terminal yellow bands on tergites one or one and three. Tarsi of all the legs black; the terminal joint of the front tarsi with a yellowish-brown spot. Spurs of the hind tibiæ brown. Length (h. + th. + t. 1 + 2), ♀ and ♂, 11.5 to 13 mm............................*P. aquilinus* R. du Buysson.

Claws of the hind tarsi less asymmetrical, the internal claw only one-third longer than the external; the apical tarsal joint slightly curved (Fig. 256). Punctation of head and thorax more remote and fine, especially on the mesonotum which is feebly granulate. Clypeus scarcely convex; with a very few scattered punctures on its smooth terminal part; its basal portion covered with a fine and dense, irregular striation. Shape of head, ♀: Fig. 255; of basal joints of antennæ, ♀: Fig. 257. Reddish-brown species; with conspicuous ivory-yellow markings on head, thorax, and abdomen; the abdomen with broad terminal bands on all its tergites and sternites. Tarsi of all the legs pale, ferruginous or yellowish, their terminal joint of the same color; spurs of the hind tibiæ ferruginous or yellowish-brown. Length (h. + th. + t. 1 + 2), ♀ and ♂, 13 to 15 mm......................*P. fastidiosus* Saussure.

3. Mesopleura with a prepectal suture in their anterior part[1]; their surface divided into three plates by a mesopleural suture and a median episternal groove (Type of *P. gallicus*, Fig. 249)..4.

Mesopleura without prepectal suture; the mesopleural suture more or less complete; the median episternal groove wanting. Head normal. Antennæ of the ♂ elongate; the joints of the flagellum not flattened, nor spirally rolled up..6.

4. ♀.— Head (Fig. 260) long and broad, distinctly broader than the thorax; the temples strongly developed, swollen; the hind margin of the vertex much more remote from the posterior ocelli than the ocelli are from the eyes. Propodeum without transverse striation. Length (h. + th. + t. 1 + 2), 10 mm. ♂ unknown..............................*P. macrocephalus*, new species.

Head normal, not broader than the thorax; temples moderately developed; the hind margin of the vertex about as far from the posterior ocelli as the ocelli are from the eyes. Propodeum with distinct transverse striæ. Antennæ in the ♂ spirally rolled up towards their extremity; the terminal joints of the flagellum flattened and excavated on their under side..................5.

5. Medium-sized species. Length (h. + th. + t. 1 + 2), ♀ and ♂, 8 to 12 mm. Antennæ, ♀, relatively heavy, their third joint as a rule shorter than the first (scape) and at most three times as long as the fourth (Fig. 265); in the ♂, the scape (first joint) distinctly shorter and scarcely thicker than the third joint (Fig. 263). Coloration very variable, from deep black to ferruginous-red, with more or less extensive, yellow markings. Wings more or less tinged with golden-yellow...........................*P. marginalis* Fabricius.

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[1] The prepectal suture may become obsolete and difficult to discover in badly preserved specimens.

Smaller species. Length (h. + th. + t. 1 + 2), ♀ and ♂, 7 to 8 mm. Antennæ, ♀, slender, their third joint scarcely shorter than the first (scape), at least three times as long as the fourth joint (Fig. 267); in the ♂ the scape is as long as the third joint and distinctly thicker (Fig. 266). Coloration chiefly black; the body covered with a brownish, somewhat rusty bloom; head of the ♀ partly ferruginous. The following markings are ivory-yellow: apical margin of clypeus; inferior part of inner orbits; anterior margin of pronotum; two longitudinal stripes on propodeum; valvula of the thorax; and an apical band on tergites one or one and two; in the ♂ also the larger part of the legs, the face, and the under side of the antennæ. Wings subhyaline, without golden tinge, with a smoky spot in their radial cell. .*P. spilophorus* Schletterer.

6. Medium-sized species. Length (h. + th. + t. 1 + 2): ♀, 11 to 12 mm.; ♂, 11 mm. Color almost uniformly pale brown, with very few ivory-white markings. The whole of the body covered with a silvery bloom, and, furthermore, with an abundant short, golden, erect pile, especially striking on the abdomen. Posterior ocelli, ♀ and ♂, scarcely one and one-half times as far from the inner margin of the eyes as from each other. . .*P. smithii* Saussure.

Smaller species. Length (h. + th. + t. 1 + 2): ♀, 9.5 mm.; ♂, 9 mm. Black, with a few yellowish-white markings. The body only with a feeble silvery bloom; the abdomen covered with short, appressed, golden pubescence, without erect hair. Posterior ocelli, ♀ and ♂, nearly twice as far from the inner margin of the eyes as from each other. . . . . *P. haugi* R. du Buysson.

101. **Polistes aquilinus** R. du Buysson

Plate I, Figure 10

♀.— In the female from Bafwasende, in the female from Leopoldville, and in one female from Stanleyville, the coloration agrees with the original description of this species. But the other females, as also the two males, have richer pale yellow markings as follows: a narrow line along the inner orbits, between the emargination of the eyes and the clypeus; small spots on the sides of the postscutellum; the valvula and two longitudinal bands in the under half of the propodeum; a feeble tubercle above the insertion of the middle and hind legs, at the under end of the meso- and metapleura; and terminal bands on tergites one and three, continuing along the sides of the first tergite, and on the apical sides of the third sternite.

♂.— Has not been hitherto described. In most of its morphological characters, it agrees with the female. Unlike most of the *Polistes* males, the shape of head and clypeus is only slightly different from that found in the female [1]: the inner orbits are more convergent towards the clypeus which ends in a broadly transverse truncation. The antennæ (Fig. 254) are long and slender, all their joints being cylindrical and elongate; joints four to twelve present on their under side distinctly raised areas (tyloides) which are elongate and carina-shaped on joints four to six, short and tuberculiform on joints seven to twelve; the apical joint is normal, elongate, straight. The last abdominal sternite (Fig. 253) ends in two strongly carina-shaped, lateral projections, which are obliquely truncate and furnished with serrate, stiff setæ at their apices. Between these projections the surface of the sternite forms a strongly depressed, discolored membrane which extends nearly over the posterior half of the sternite; the chitinous convex part of the sternite, in front of the depression, has a superficial longitudinal median groove.[1]

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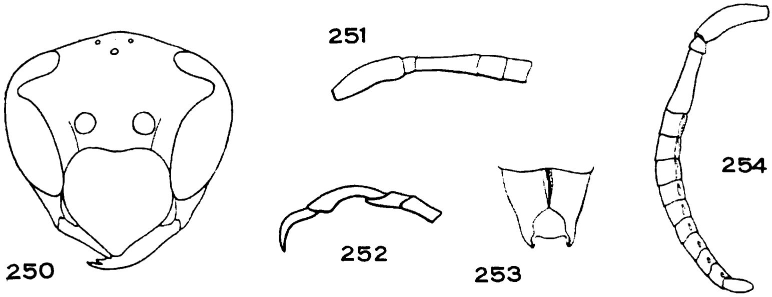
[1] This is also true for *P. fastidiosus* Saussure, as well in its typical form as in its var. *sikoræ* (Saussure) and may perhaps be used as a character of the *madecassus* group.



Figs. 250–254. *Polistes aquilinus* R. du Buysson.

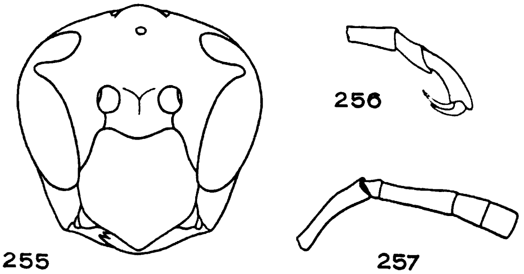
Fig. 250. Head in front, ♀. Fig. 251. Basal joints of antenna, ♀. Fig. 252. Apical joints of hind tarsus, ♀. Fig. 253. Terminal sternite of abdomen, ♂. Fig. 254. Antenna, ♂, showing the tyloides on its under side.

Belgian Congo.— Leopoldville, 1 ♀ and 2 ♂♂; Stanleyville, 10 ♀♀, April 1915; and Bafwasende, 1 ♀ and 2 ♂♂, October 1909 (Lang and Chapin Coll.).

This species is apparently restricted to the West African forest region, being known from Sierra Leone, Cameroon, Gaboon, and the Belgian Congo.

102. **Polistes fastidiosus** H. de Saussure

Belgian Congo.— Garamba, 7 ♀♀, June and July 1912 (Lang and Chapin Coll.).



Figs. 255–257. *Polistes fastidiosus* Saussure.

Fig. 255. Head in front, ♀. Fig. 256. Apical joints of hind tarsus, ♀. Fig. 257. Basal joints of antenna, ♀.

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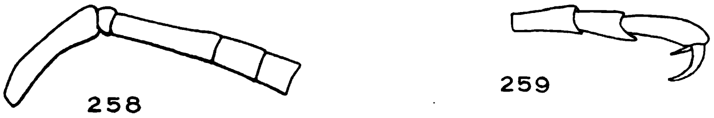
[1] The shape of the apical sternite of the male is very much the same in *P. fastidiosus* Saussure and its var. *sikoræ* (Saussure).

These specimens from the savannah region of the extreme northeastern Uele have exactly the same coloration as the females and males from Lourenzo Marques which I have seen in the collections of Cornell University.

A. v. Schulthess[1] suggests that *P. sikoræ* Saussure is only the Malagasy race of *P. fastidiosus* Saussure, and after careful comparison of both forms I believe this to be true.

103. **Polistes smithii** Saussure

Belgian Congo.— The collection includes only 2 ♀ ♀ of this species from Thysville and Kinshasa, June 1915 (Lang and Chapin Coll.).



Figs. 258–259. *Polistes smithii* Saussure.
Fig. 258. Basal joints of antenna, ♀. Fig. 259. Apical joints of hind tarsus, ♀.

104. **Polistes haugi** R. du Buysson

P. haugi and *P. smithii* are very closely related; in the male, the shape of the antennæ and of the apical abdominal sternite are similar.

Belgian Congo.— Stanleyville, 2 ♂♂ and 4 ♀ ♀, April 1915 (Lang and Chapin Coll.).

105. **Polistes macrocephalus,** new species

♀.— Head (Fig. 260) strongly inflated behind the eyes; the temples distinctly visible on the sides of the eyes when the head is seen in front; from above, the head is about twice as broad as long and much broader than the thorax; in profile, the temples are much broader than the eyes and scarcely narrower than the length of the third antennal joint. Carina limiting the temples behind only distinct in their upper part, disappearing behind the vertex and in their inferior half above the mandibles. Ocelli in an equilateral triangle; the posterior ocelli much more remote from the inner margin of the eyes than from each other; the vertex is very long, the distance between its hind margin and the posterior ocelli about one and one-half times that separating the posterior ocelli from the inner margin of the eyes. Oculo-malar space moderately long. Clypeus convex, its anterior margin projecting on its middle in a broadly rounded apex. Antennæ (Fig. 262) slender; their third joint slightly shorter than the scape and about three times as long as the fourth.

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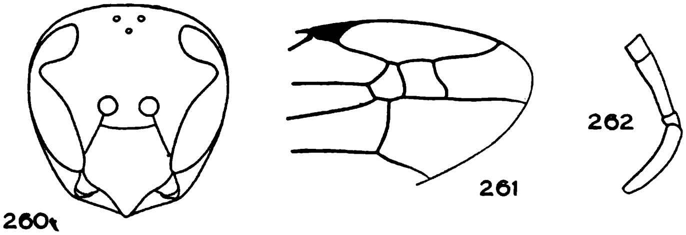
[1] Reise Ost-Afrika, 1903–05, Voeltzkow, Wiss. Ergebn., II, Heft 2, 1907, p. 67.

Thorax much as in *P. marginalis* Fabricius; the mesopleura with a distinct mesopleural suture and with a median episternal groove; also with a prepectal raised suture in their anterior part [type of *P. gallicus* (Linné)]. Scutellum without any trace of raised, median line. Propodeum remarkable for the almost complete lack of transverse striation; the sculpture is very minutely granulose all over; only with a faint trace of striæ on its sides in their upper part, just behind the base of the hind wings and also near its apex above the valvula. Propodeum almost without median longitudinal depression. Wing venation (Fig. 261) of the ordinary *Polistes* type. Legs normal; their claws symmetrical; the apical joint of the tarsi short and not curved.

Abdomen elongate and oval, much as in *P. marginalis*. First segment bell-shaped; as seen from above, about as long as wide at its apex; its tergite abruptly raised above its base.

Sculpture of the integument microscopical; the head, thorax, and abdomen almost uniformly covered with an extremely minute, dense punctation except on the propodeum, the sculpture of which has been given above. Temples and clypeus with a few scattered, stronger punctures. The whole body covered with a silvery bloom.



Figs. 260–262. ***Polistes macrocephalus*, new species.**

Fig. 260. Head in front, ♀. Fig. 261. Venation of front wing, ♀. Fig. 262. Basal joints of antenna, ♀.

Black. Mandibles partly, oculo-malar space, outer orbits, an oblique line on each side of the vertex, under side of the flagellum, coxæ, femora, and tibiæ, ferruginous-red; the hind tibiæ turning black on their outer side. A spot on the mandibles, inner edge of the oculo-malar space, anterior half of the clypeus, inner orbits from the clypeus to the emargination of the eyes, two small dots beneath the insertion of the antennæ, under side of the scape, a very narrow line on the anterior margin of the postscutellum, valvula of the propodeum, a narrow apical margin on tergite 1 broadened on the sides so as to form lateral margins, and a small spot in the extreme basal angle of tergite 2, ivory-white. Spurs of the tibiæ brownish-black. Wings moderately smoky throughout, with a slight purplish effulgence, darker in their radial cell.

Length (h. + th. + t. 1 + 2), 10 mm. (total length, 13 mm.).

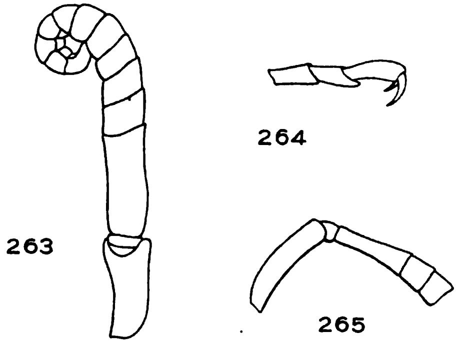
♂ unknown.

Belgian Congo.— Described from a single ♀ from Walikale (in the forest region of the eastern Belgian Congo), January 15, 1915. (J. Bequaert Coll.).

This species comes in the group of *P. marginalis* (Fabricius) and *P. spilophorus* Schletterer, owing to the structure of the mesopleura, but can easily be separated from all the described African species by its swollen head.

106. **Polistes marginalis** Fabricius

The color markings of this species being exceedingly variable, it is well to study carefully its true morphological characters, which are given in the key. The shape of the antennæ in the male (Fig. 263) is very peculiar; the joints of the flagellum, from the fifth to the apical one, are flattened dorso-ventrally and slightly excavated beneath where they present small tyloides; they are spirally rolled up towards the apex. The second joint of the flagellum is very long, much longer than the scape.



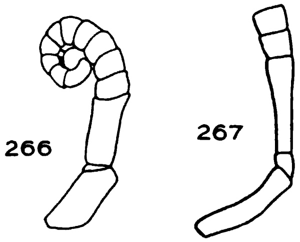
Figs. 263–265. ***Polistes marginalis*** **Fabricius.**
Fig. 263. Antenna, ♂. Fig. 264. Apical joints of hind tarsus, ♀. Fig. 265. Basal joints of antenna, ♀.

Belgian Congo.— One of the most common wasps. The collection includes several hundred ♀ ♀ and ♂ ♂ from Banana, Malela, Zambi, Boma, Matadi, Thysville, Kinshasa, Leopoldville, Coquilhatville, Stanleyville, Bengamisa, Vankerckhovenville, Faradje, Garamba, and Niangara (Lang and Chapin Coll.). Bogoro, Kabare, Walikale, and Lubutu (J. Bequaert Coll.).

This species is distributed over the major part of the Ethiopian region; it is apparently lacking on Madagascar, though it has been recorded from the Comoro Islands.

107. **Polistes spilophorus** Schletterer

There exists in the Belgian Congo a small *Polistes* which is very similar to *P. marginalis.* It has been described by Schletterer as *P. spilophorus,* and I am convinced that *P. tenellus* R. du Buysson is the same species.

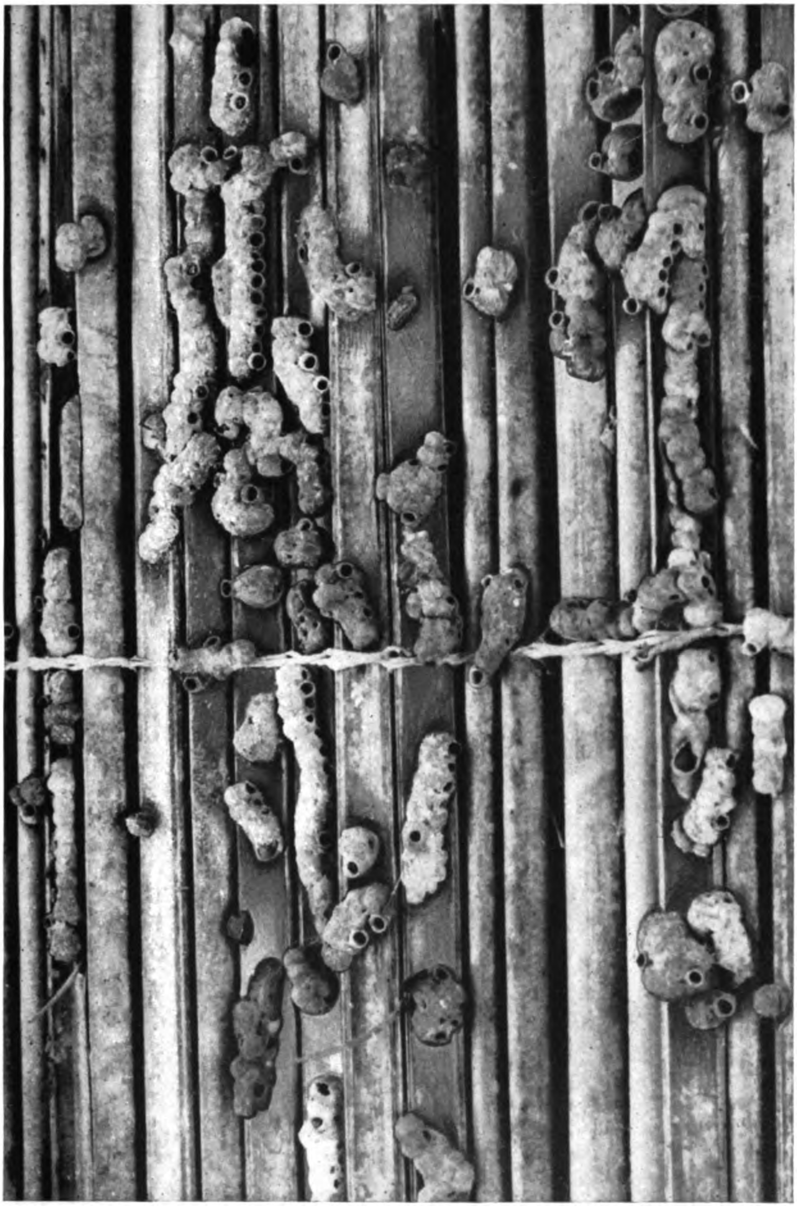


Figs. 266–267. *Polistes spilophorus* Schletterer.
Fig. 266. Antenna, ♂. Fig. 267. Basal joints of antenna, ♀.

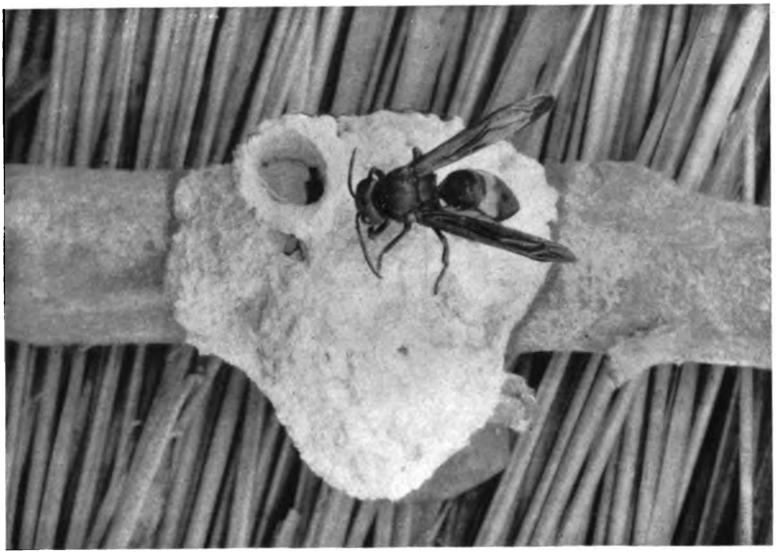
In the male, the antennæ (Fig. 266) are flattened and spirally rolled up, as in *P. marginalis,* but the third joint is much shorter, not longer than the first (scape).

The females are much more difficult to separate from *P. marginalis,* but I believe, nevertheless, that *marginalis* and *spilophorus* are specifically distinct.

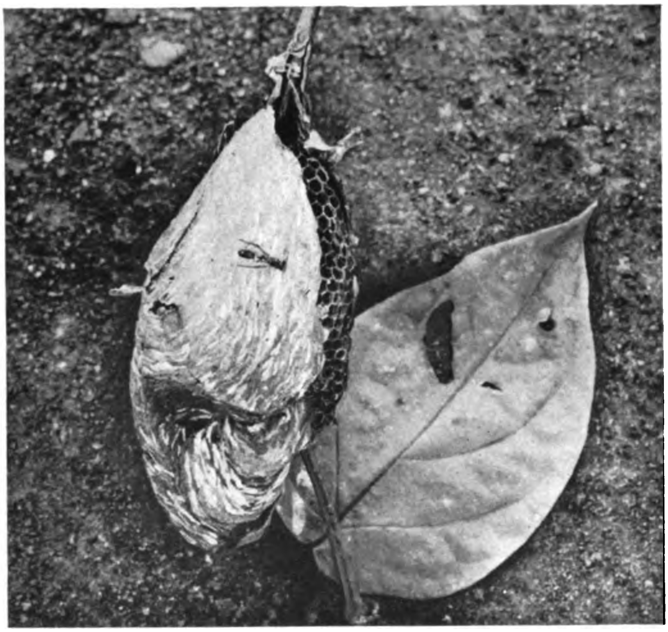
Belgian Congo.— Banana, 1 ♀, September 1915; Boma, 2 ♀ ♀, June 1915; Thysville, 1 ♀, June 1915; Stanleyville, 5 ♀ ♀ and 3 ♂♂, April 1915 (Lang and Chapin Coll.). Walikale, 2 ♂♂ and 1 ♀, January 1915 (J. Bequaert Coll.).



Colony of *Synagris cornuta* (Linné), at Bengamisa, September 1914.



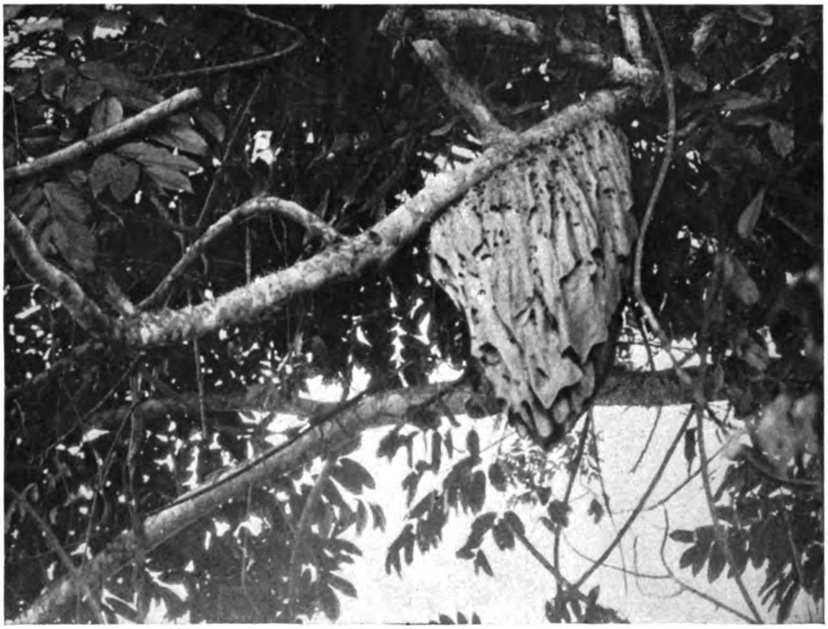
1



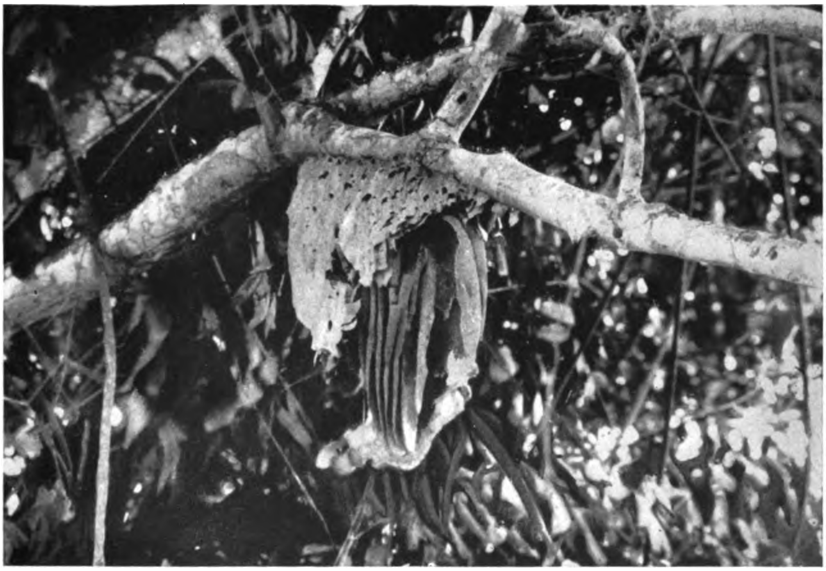
2

Fig. 1. Nest of *Synagris cornuta* (Linné) var. *flavofasciata* J. Bequaert, at Medje, June 1914.

Fig. 2. Nest of *Polybioides tabida* (Fabricius), at Medje, April 1914.



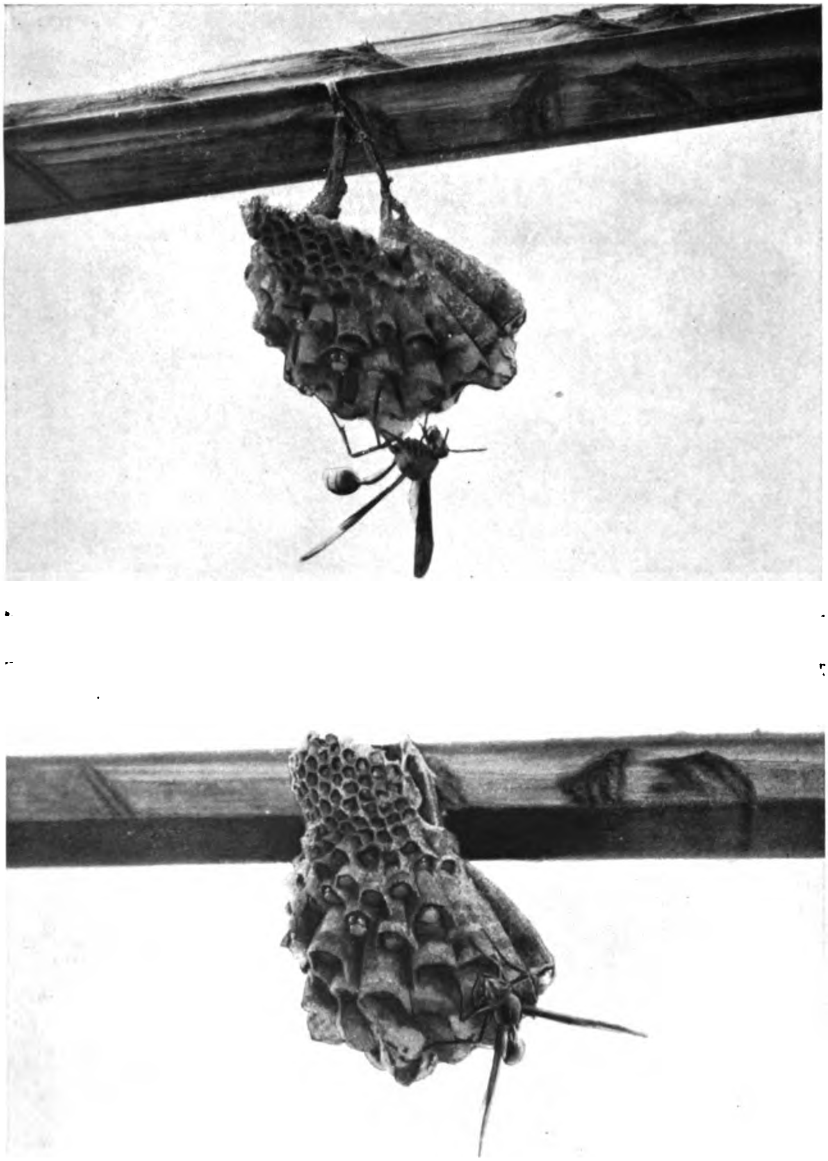
1



2

Fig. 1. Nest of *Polybioides melaina* G. Meade Waldo, at Stanleyville, August 1909.

Fig. 2. The same nest of *P. melaina*, partly destroyed.



Nest of *Belonogaster dubius* Kohl, at Faradje, September 1912; photographed from two different sides.

EXPLANATION OF PLATES I–VI

PLATE I

Fig. 1. *Paramischocyttarus buyssoni* Gribodo, ♂, x 2.
Fig. 2. *Pachymenes congensis* J. Bequaert, type, ♀, x 3.
Fig. 3. *Eumenes maxillosus* var. *tropicalis* (H. de Saussure), ♀, natural size.
Fig. 4. *Odynerus osborni* J. Bequaert, type, ♀, natural size.
Fig. 5. *Zethus rodhaini* J. Bequaert, type, ♀, x 2.
Fig. 6. *Synagris æstuans* (Fabricius), ♀, natural size.
Fig. 7. *Polybioides tabida* (Fabricius), ♀, x 2.
Fig. 8. *Ancistrocerus kisangani* J. Bequaert, type, ♂, x 3.
Fig. 9. *Belonogaster junceus* (Fabricius), ♂, natural size.
Fig. 10. *Polistes fastidiosus* H. de Saussure, ♀, x 1½.
Fig. 11. *Ropalidia guttatipennis* (H. de Saussure), ♂, x 2.

PLATE II

Color varieties of *Synagris cornuta* (Linné). All natural size.

Fig. 1. *Synagris cornuta* var. *rufithorax* J. Bequaert, type, ♀.
Fig. 2. " " (Linné), typical form, ♂.
Fig. 3. " " var. *ituriensis* J. Bequaert, allotype, ♂.
Fig. 4. " " var. *didieri* (R. du Buysson), ♀.
Fig. 5. " " var. *basalis* (Mocsáry), ♀.
Fig. 6. " " var. *maculata* J. Bequaert, type, ♀.
Fig. 7. " " var. *flavofasciata* J. Bequaert, allotype, ♂.
Fig. 8. " " var. *similis* J. Bequaert, type, ♀.

PLATE III

Colony of *Synagris cornuta* (Linné), at Bengamisa, September 1914.

PLATE IV

Fig. 1. Nest of *Synagris cornuta* (Linné) var. *flavofasciata* J. Bequaert, at Medje, June 1914.

Fig. 2. Nest of *Polybioides tabida* (Fabricius), at Medje, April 1914.

PLATE V

Fig. 1. Nest of *Polybioides melaina* G. Meade Waldo, at Stanleyville, August 1909.

Fig. 2. The same nest of *P. melaina*, partly destroyed.

PLATE VI

Nest of *Belonogaster dubius* Kohl, at Faradje, September 1912; photographed from two different sides.

A BIBLIOGRAPHIC AND SYNONYMIC CATALOGUE OF THE ETHIOPIAN VESPIDÆ

The following list brings together the published references to the diplopterous wasps of the Ethiopian region. With a few exceptions, these references have been checked up with the original paper. I am much indebted to Mr. J. C. Crawford, of the United States National Museum, for prompt and courteous aid in securing valuable bibliographic information.

I was unable to consult the following publications; they are quoted here after Dalla Torre's Catalogus Hymenopterorum.

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Lepeletier, in Encyclopédie méthodique, Ins., X, 1825.
Maindron, Moniteur du Sénégal et Dépendances, 1879.

Masarinæ

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Ent. Syst., II, 1793, pp. VI and 283.
Mazaris W. A. Schulz, Zoolog. Ann. Würzburg, IV, 1911, p. 199.
Genotype: *Masaris vespiformis* Fabricius, 1793.

1. **Masaris discrepans** H. Brauns, Ent. Mitt. Berlin, II, 1913, p. 203; Pl. ii, fig. 9*a* (♀ ♂).
Cape Colony.— Type locality: " Worcester."

2. **Masaris saussurei** H. Brauns, Ann. Mus. nat. Hungarici, III, 1905, pp. 219 and 222 (♀ ♂); Ent. Mitt. Berlin, II, 1913, p. 205; Pl. ii, fig. 10*a*; Zeitschr. wiss. Insektenbiol., VI, 1910, p. 387 (ethology).
Cape Colony.— Type locality: " Willowmore."

3. **Masaris spinolæ** H. de Saussure, Et. fam. Vesp., III, Masar., 1854, p. 95 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 5. Dalla Torre, Cat., IX, Vesp., 1894, p. 4; Gen. Ins. Vesp., 1904, p. 8.
Cape Colony.— Type locality: " Cap de Bonne-Espérance."
Belongs, perhaps, to the genus *Masariella* Brauns.

2. **Masariella** H. Brauns

Ann. Mus. nat. Hungarici, III, 1905, p. 223.
Genotype: *Masaris alfkeni* R. du Buysson, 1904.

1. **Masariella alfkeni** (R. du Buysson) H. Brauns, Ann. Mus. nat. Hungarici, III, 1905, p. 223 (♀ ♂); Zeitschr. wiss. Insektenbiol., VI, 1910, p. 446 (ethology).
Masaris alfkeni R. du Buysson, Bull. Soc. ent. France, 1904, p. 144 (♀).
Cape Colony, Damaraland.— Type locality: " Swakopmund."

3. **Ceramius** LATREILLE

Considér. génér. Crust. Arachn. Ins., 1810, pp. 329 and 438.

Gnatho KLUG, Mag. Ges. naturf. Freunde Berlin, IV, 1810, p. 36 (*nec* ILLIGER, 1807).

Genotype: *Ceramius fonscolombii* Latreille, 1810.

1. **Ceramius beyeri** H. BRAUNS, Zeitschr. syst. Hym. Dipt., III, 1903, p. 69 (♀ ♂); Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology); Ent. Mitt. Berlin, II, 1913, Pl. II, figs. 4*a–c*.

Cape Colony.— Type locality: " Willowmore."

2. **Ceramius bicolor** (THUNBERG) W. A. SCHULZ, Berliner ent. Zeitschr., LVII, 1912, p. 68.

Philanthus bicolor THUNBERG, Nova Acta Soc. Sc. Upsala, VII, 1815, pp. 127, 131, and 289 (♂).

Ceramius karrooensis H. BRAUNS Zeitschr. syst. Hym. Dipt., II, 1902, p. 282 (♀ ♂); III, 1903, p. 68; Zeitschr. wiss. Insektenbiol., VI, 1910, p. 387 (ethology); Ent. Mitt. Berlin, II, 1913, Pl. II, figs. 5*a–f*.

Cape Colony.— Type locality: unknown.

3. **Ceramius caffer** H. de SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 76 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 2; Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: " Cap de Bonne-Espérance."

Perhaps a variety of *C. lichtensteinii* Klug.

4. **Ceramius capensis** H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 66; Pl. III, figs. 3 and 3*a* (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 3. DALLA TORRE, Cat., IX, Vesp., 1894, p. 2; Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: " Cap de Bonne-Espérance."

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Cape Colony.— Type locality: " Willowmore."

6. **Ceramius cerceriformis** H. DE SAUSSURE, Ann. Soc. ent. France, (3), I, 1853, Bull., p. xxi (♂); Et. fam. Vesp., III, Masar., 1854, p. 72; Pl. IV, figs. 1 and 1*a–d* (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 2; Gen. Ins. Vesp., 1904, p. 6; Pl. I, figs. 4 and 4*a–b*.

Cape Colony.— Type locality: " Cap de Bonne-Espérance."

Belongs to the subgenus *Ceramioides* Saussure.

7. **Ceramius consobrinus** H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 77 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 5. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6. H. BRAUNS, Ent. Mitt. Berlin, II, 1913, p. 198; Pl. II, figs. 2*a–d* (♀ ♂).

Cape Colony.— Type locality: " Cap de Bonne-Espérance."

8. **Ceramius fumipennis** H. BRAUNS, Zeitschr. syst. Hym. Dipt., II, 1902, p. 275 (♀ ♂); III, 1903, p. 68; Ent. Mitt. Berlin, II, 1913; Pl. II, figs. 8*a–f*; Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: " Willowmore."

9. **Ceramius lichtensteinii** KLUG, Entom. Monogr., 1824, p. 225. H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 73. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6. H. BRAUNS, Ent. Mitt. Berlin, II, 1913, p. 194; Pl. II, figs. 1*a*–*b*; Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology).

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Ceramius rufomaculatus P. CAMERON, Trans. South African Philos. Soc., XVI, pt. 4, 1906, p. 325 (♀).

Cape Colony.— Type locality: "Cap."

9*a*. var. **macrocephalus** (H. DE SAUSSURE) H. Brauns, Ent. Mitt. Berlin, II, 1913, p. 194 (♀ ♂).

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Cape Colony.— Type locality: "Cap de Bonne-Espérance."

10. **Ceramius linearis** KLUG, Entom. Monogr., 1824, p. 227 (♂). H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 71. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: "Uitenhagen."

Belongs to the subgenus *Paraceramius* Saussure.

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Cape Colony.— Type locality: "Cap de Bonne-Espérance."

Belongs to the subgenus *Paraceramius* Saussure.

12. **Ceramius peringueyi** H. BRAUNS, Ent. Mitt. Berlin, II, 1913, p. 194 (♀).

Cape Colony.— Type locality: "Capstadt."

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Cape Colony.— Type locality: "Cap de Bonne-Espérance."

Perhaps a variety of *C. lichtensteinii* Klug.

14. **Ceramius schulthessi** H. BRAUNS, Zeitschr. syst. Hym. Dipt., II, 1902, p. 182 (♀); Ent. Mitt. Berlin, II, 1913, p. 196; Pl. II, figs. 6*a*–*d* (♀ ♂); Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: "Willowmore."

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Cape Colony.— Type locality: "Cap de Bonne-Espérance."

4. **Celonites** LATREILLE

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Genotype: *Vespa abbreviata* Villers, 1789 (= *Chrysis dubia* Rossi, 1790; *Masaris apiformis* Fabricius, 1793).

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Cape Colony.— Type locality: "Willowmore."

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Cape Colony.— Type locality: "Willowmore."

3. **Celonites clypeatus** H. BRAUNS, Ent. Mitt. Berlin, II, 1913, pp. 206 and 207 (♀).

Cape Colony.— Type locality: "Willowmore."

4. **Celonites fischeri** SPINOLA, Ann. Soc. ent. France, VII, 1838, p. 505 (♀). C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, pt. 1, 1898, p. 111. R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1908, p. 103 (♀ ♂).

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Egypt, Southern Arabia.— Type locality: "Egypte."

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Obock.— Type locality: "Obock, Djibouti, Tadjourah."

6. **Celonites promontorii** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 232 and 233 (♀); Ent. Mitt. Berlin, II, 1913, pp. 205, 207, and 208 (♀ ♂).

Cape Colony.— Type locality: "Willowmore."

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Cape Colony.— Type locality: "Willowmore."

7a. var. **flavomaculatus** H. BRAUNS, Ent. Mitt. Berlin, II, 1913, pp. 205 and 208 (♂).

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8. **Celonites rothschildi** R. DU BUYSSON, Rev. d' Ent. Caen, XXV, 1906, p. 105 (♂).

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9. **Celonites wheeleri** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 230 and 233 (♀ ♂); Ent. Mitt. Berlin, II, 1913, pp. 207 and 208 (♀ ♂).

Cape Colony.— Type locality: "Willowmore."

9*a*. var. **immaculatus** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 230 and 233 (♀); Ent. Mitt. Berlin, II, 1913, pp. 205, 207, and 208 (♀ ♂).

Cape Colony.— Type locality: "Willowmore."

5. **Jugurtia** H. DE SAUSSURE

Et. fam. Vesp., III, Masar., 1854, p. 83.

Jugurthia DALLA TORRE, Cat., IX, Vesp., 1894, p. 5.

Jujurtha ASHMEAD, Canadian Entom., XXXIV, 1902, p. 220.

Genotype: *Celonites oraniensis* Lepeletier, 1841.

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Genotype: *Quartinia dilecta* Gribodo, 1884.

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Cape Colony.— Type locality: " Algoa Bay."
2. **Quartinia paradoxa** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, p. 233 (♂).
Cape Colony.— Type locality: " Willowmore."

RAPHIGLOSSINÆ

7. **Raphiglossa** S. S. SAUNDERS

Trans. Ent. Soc. London, (2), I, pt. 3, 1850, p. 71.
Rhaphidoglossa DALLA TORRE, Cat., IX, Vesp., 1894, p. 7.
Genotype: *Raphiglossa eumenoides* S. Saunders, 1850.

1. **Raphiglossa braunsiana** (A. VON SCHULTHESS).
Rhaphidoglossa braunsiana A. VON SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 1 (♂).
Cape Colony.— Type locality: " Willowmore."
2. **Raphiglossa flavo-ornata** (P. CAMERON).
Rhaphiglossa flavo-ornata P. CAMERON, Trans. South African Philos. Soc., XV, pt. 4, 1905, p. 231 (♀); Ann. Transvaal Mus., II, 3, 1910, p. 156.
Rhaphidoglossa flavo-ornata G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 45 (♀ ♂).
Rhaphidoglossa punctata G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 34 (♂); (8), VIII, 1911, p. 449 (♀ ♂).
Cape Colony, Transvaal, Angola, North East Rhodesia, Katanga, northeastern Uele.— Type locality: " Dunbrody."
3. **Raphiglossa natalensis** F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 8; Pl. I, fig. 4 (♀).
Rhaphidoglossa natalensis DALLA TORRE, Cat., IX, Vesp., 1894, p. 7; Gen. Ins. Vesp., 1904, p. 12. G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 450. A. VON SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270.
Natal, Delagoa Bay.— Type locality: " Port Natal."
4. **Raphiglossa symmorpha** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 279; Pl. VIII, fig. 2 (♀); III, Suppl., 1854, p. 114. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 612 (♀). P. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 608.
Rhaphidoglossa symmorpha DALLA TORRE, Cat., IX, Vesp., 1894, p. 7; Gen. Ins. Vesp., 1904, p. 12.

Raphiglossa filiformis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 3 (♂, *nec* ♀).

Abyssinia, (Algeria?).— Type locality: " Algérie."

ZETHINÆ

8. **Zethus** FABRICIUS

Syst. Piez., 1804, pp. xii and 282.

Calligaster H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 22.

Genotype: *Vespa cæruleopennis* Fabricius, 1798.

1. **Zethus delagoensis** A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270 (♀).

Calligaster delagoensis DALLA TORRE, Gen. Ins. Vesp., 1904, p. 17.

Discœlius transvaalensis C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 218 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 18.

Delagoa Bay, eastern Transvaal.— Type locality: " Delagoa."

I have seen females from Delagoa Bay, which agree perfectly with A. v. Schulthess' description of *Z. delagoensis* and also with Bingham's *Discœlius transvaalensis*, so that I feel sure of the identity of both; *Z. pubescens* Smith may be the same species.

2. **Zethus favillaceus** WALKER, List Hym. Egypt, 1871, p. 28 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 11; Gen. Ins. Vesp., 1904, p. 17.

Obock.— Type locality: " Tajura."

3. **Zethus (?) pubescens** F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 9 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 13; Gen. Ins. Vesp., 1904, p. 16.

Natal.— Type locality: " Port Natal."

4. **Zethus rodhaini** J. BEQUAERT. See p. 33 (♀).

Belgian Congo.— Type locality: Walikale.

9. **Elimus** H. DE SAUSSURE

Et. fam. Vesp., I, Eum., 1852, p. 7.

Genotype: *Elimus australis* H. de Saussure, 1852.

1. **Elimus arabicus** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 40 (♀).

Obock.— Type locality: " Straits of Bab-el-Mandeb."

This species may be a synonym of *Zethus favillaceus* Walker, 1871, which was described from the same locality.

10. **Pareumenes** H. DE SAUSSURE

Et. fam. Vesp., III, Suppl., 1854, p. 133.

Genotype: *Eumenes quadrispinosus* Saussure, 1854.

1. **Pareumenes sansibaricus** (W. A. SCHULZ).

Eumenes sansibarica W. A. SCHULZ, Hymen. Studien, 1905, p. 9 (♀).

Pareumenes marshalli G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 45 (♀).

Zanzibar, Mashonaland.— Type locality: " Sansibar."

11. **Paramischocyttarus** P. MAGRETTI

Bull. Soc. ent. Italiana, XV, (1883), 1884, p. 250; Ann. Mus. civ. Genova, XXI, 1884, p. 600.

Tanyzethus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 195.

Genotype: *Paramischocyttarus subtilis* Magretti, 1884.

1. **Paramischocyttarus buyssoni** (GRIBODO) DALLA TORRE, Gen. Ins. Vesp., 1904, p. 83.

Paramiscocytharus buyssoni GRIBODO, Miscellanea entomologica, IV, 1896, p. 13 (♂).

Senegal, Belgian Congo.— Type locality: " Dakar."

2. **Paramischocyttarus lacuum** H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34 (♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 83.

Lake Nyasa.— Type locality: " Nyassa-See."

3. **Paramischocyttarus subtilis** P. MAGRETTI, Bull. Soc. ent. Italiana, XV, (1883), 1884, p. 251, fig. 2 (♂); Ann. Mus. civ. Genova, XXI, 1884, p. 602, fig. (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 83; Pl. VI, figs. 3*a*, 3*b*, and 3*c*. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

Tanyzethus africanus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 195 (♀).

Paramischocyttarus africanus G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 54.

East Africa, Abyssinia.— Type locality: " torrente Gasch nella vicinanze di Kassala " (eastern Sudan).

12. **Ischnogasteroides** P. MAGRETTI

Bull. Soc. ent. Italiana, XV, (1883), 1884, p. 251. Ann. Mus. civ. Genova, XXI, 1884, p. 603.

Genotype: *Ischnogasteroides flavus* Magretti, 1884.

1. **Ischnogasteroides flavus** MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 606, fig. (♀); Bull. Soc. ent. Italiana, XV, (1883), 1884, p. 252, fig. 3. DALLA TORRE, Cat., IX, Vesp., 1894, p. 113; Gen. Ins. Vesp., 1904, p. 84; Pl. VI, figs. 5*a* and 5*b*.

Abyssinia.— Type locality: " rive del Kor Cheru (confini settentrionali dell' Abissinia)."

13. **Labus** H. DE SAUSSURE

Reise d. Novara, Zool., II, 1, Hym., 1867, p. 3.

Smithia H. DE SAUSSURE, Rev. Mag. de Zool., (2), VII, 1855, p. 371 (*nec* EDWARDS and HAIME, 1851).

Hymenosmithia Dalla Torre, Gen. Ins. Vesp., 1904, p. 61.
Stroudia Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 262.
Micreumenes Ashmead, Canadian Entomologist, XXXIV, 1902, p. 208.
Genotype: *Labus spiniger* H. de Saussure, 1867.

1. **Labus annulatus** G. Meade Waldo, Ann. Mag. Nat. Hist., (8), V, 1910, p. 36 (♀ ♂); (8), VIII, 1911, p. 450.

Natal.— Type locality: "Durban."

2. **Labus annulipes** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exped. Kilimandjaro, II, 8, 6, 1910, p. 182 (♂). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 50 (♀ ♂).

Labus fragilis G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 433 (♀ ♂).

Rhodesia, East Africa.— Type locality: "Kilimandjaro, lower Kibonoto."

3. **Labus armatus** (Gribodo) F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249.

Stroudia armata Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 264 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 14; Gen. Ins. Vesp., 1904, p. 18.

Cape Colony.— Type locality: "Port Elizabeth."

4. **Labus chudeaui** R. du Buysson, Bull. Soc. ent. France, 1908, p. 132 (♀).

Southern Sahara.— Type locality: "Ahaggar (oued Amga)."

The generic position of this species is doubtful.

5. **Labus floricola** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 151; Pl. xxii, fig. 3 (♂, described as ♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 235 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 8; Gen. Ins. Vesp., 1904, p. 13. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 228 and 244; Pl. iv, figs. 28 and 29; Pl. vi, figs. 5 and 23; Pl. vii, figs. 11, 21, and 26 (♂).

Madagascar, Nossi Bé.— Type locality: "Madagascar: Antananarivo."

6. **Labus garambensis** J. Bequaert. See p. 51 (♀ ♂).

Belgian Congo.— Type locality: Garamba.

7. **Labus gracilis** F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 227 and 242; Pl. vi, fig. 27; Pl. vii, figs. 6, 22, and 23 (♂).

Arabia.— Type locality: "Halbinsel Sinai (Tor)."

8. **Labus macrostylus** F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 232 and 242; Pl. iv, fig. 20; Pl. vi, figs. 3 and 26; Pl. vii, fig. 2 (♀).

Micreumenes curriei Ashmead, Canadian Entomol., XXXIV, 1902, p. 208 (without description).

Sierra Leone, Liberia, Belgian Congo.— Type locality: "Sierra Leone."

9. **Labus maculicollis** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 181 (♀ ♂). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51.

Labus adelphus G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 452 (♂).

Uganda, East Africa, Belgian Congo.— Type locality: "Kilimandjaro: Kibonoto, 1000–1300 m."

10. **Labus madecassus** A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, Heft 2, 1907, p. 69, figs. 4–8 (♂).

Madagascar.— Type locality: " Kinkuni-See (N. W. Madagascar)."

11. **Labus maindroni** R. du Buysson, Rev. d' Ent. Caen, XXV, 1906, p. 107 (♀). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 450.

Obock.— Type locality: " Obock."

12. **Labus natalensis** (Saussure).

Smithia natalensis H. de Saussure, Rev. Mag. de Zool., (2), VII, 1855, p. 371 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 9; Pl. i, fig. 5. Dalla Torre, Cat., IX, Vesp., 1894, p. 8.

Hymenosmithia natalensis Dalla Torre, Gen. Ins. Vesp., 1904, p. 61.

Natal.— Type locality: " Port Natal."

13. **Labus rothschildanus** R. du Buysson, Rev. d'Ent. Caen, XXV, 1906, p. 106 (♂). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 451.

British East Africa.— Type locality: " Makindu."

14. **Labus rufipes** (P. Cameron).

Smithia (?) rufipes P. Cameron, Trans. South African Philos. Soc., XV, pt. 4, 1905, p. 230 (♂).

Cape Colony.— Type locality: " Brak Kloof."

Probably a synonym of *L. natalensis* (Saussure).

15. **Labus rufipetiolatus** A. v. Schulthess, Soc. entomol., XXVIII, 1913, p. 1, fig. (♂).

Cape Colony.— Type locality: " Kapland."

16. **Labus superbus** G. Meade Waldo, Ann. Mag. Nat. Hist., (8), V, 1910, p. 36 (♂).

White Nile.— Type locality: " White Nile."

17. **Labus swalei** G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 451 (♀ ♂).

Nubian desert.— Type locality: " between Korosko and Abu Hamed."

EUMENINÆ

14. **Eumenes** Latreille[1]

Hist. nat. Crust. Ins., III, 1802, p. 360.

Genotype: *Vespa coarctata* Linné, 1758.

1. **Eumenes acuminatus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 147; Pl. viii, fig. 2 (♂). F. Smith, Cat. Hym. Brit. Mus., V. Vesp., 1857, p. 26. Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 296 (♀); Bull. Soc. ent. Italiana, XVI, 1884, p. 284. Dalla Torre, Cat., IX, Vesp., 1894, p. 17; Gen. Ins. Vesp., 1904, p. 20. A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17.

Cape Colony, Abyssinia.— Type locality: " le Cap de Bonne-Espérance."

According to A. v. Schulthess, Soc. entomol., XXV, 1910, p. 24, *E. acuminatus* Gribodo is specifically distinct from *E. acuminatus* H. de Saussure.

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[1] **_E. artifex_ Smith and _E. perplexus_ Smith, recorded from the Ethiopian region by Dalla Torre, Gen. Ins. Vesp., 1904, are found only in the Oriental region.**

2. **Eumenes arbustorum** (PANZER) SCHENCK, Jahrb. Ver. Naturk. Nassau, IX, 1, 1853, p. 79.

Vespa arbustorum PANZER, Fauna Ins. Germaniæ, VI, 1799, p. 63; Pl. v.

Eumenes macrocephala H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 37 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. DALLA TORRE, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23.

E. macrocephala was described from South Africa; A. v. Schulthess, however, found the type specimen cospecific with the Palearctic *E. arbustorum*; the locality label was probably incorrect, as this species was never since recorded from South Africa (Soc. entomol., XXV, 1910, p. 24).

3. **Eumenes bisignatus** WALKER, List Hym. Egypt, 1871, p. 29 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 19; Gen. Ins. Vesp., 1904, p. 21.

Arabia.— Type locality: " Wâdy Ferran."

4. **Eumenes braunsianus** A. v. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 2 (♀ ♂).

South Africa.— Type locality: " Johannisburg."

5. **Eumenes caffer** (LINNÉ) H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 45 (♀). F. SMITH, Cat., Hym. Brit. Mus., V, Vesp., 1857, p. 26. WALKER, List Hym. Egypt, 1871, p. 29. DALLA TORRE, Cat., IX, Vesp., 1894, p. 19; Gen. Ins. Vesp., 1904, p. 21. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 219. R. DU BUYSSON, Bull. Soc. ent. France, 1908, p. 134; in A. Chevalier, L'Afrique centrale française, 1908, p. 707; Act. Soc. Linn. Bordeaux, LXIV, 1910, p. 228. A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17.

Vespa caffra LINNÉ, Syst. Nat., ed. 12a, I, 2, 1767, p. 951. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 670.

Sphex cruciata CHRIST, Naturg. d. Insecten, 1791, p. 317; Pl. xxxii, fig. 2.

Vespa crucigera WEBER, Observ. entom., 1801, p. 101.

Eumenes formosa H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 55 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 24; Gen. Ins. Vesp., 1904, p. 22.

Distribution of the typical form: Cape Colony, Transvaal, Atlantic coast of the Sahara, Central Sahara, Belgian Congo.— Type locality: "ad Cap. B. spei."

5*a*. var. **dyscherus** (H. DE SAUSSURE).

Eumenes dyschera H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 50 (♀). F. SMITH, Cat. Hym. Brit. Mus., V. Vesp., 1857, p. 27. DALLA TORRE, Cat., IX, Vesp., 1894, p. 23; Gen. Ins. Vesp., 1904, p. 22.

Tropical Africa, Belgian Congo.— Type locality: " l'Afrique tropicale."

5*b*. var. **esuriens** (FABRICIUS).

Vespa esuriens FABRICIUS, Mant. Ins., I, 1787, p. 293. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 673.

Eumenes esuriens H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 56; Pl. xi, fig. 2 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 23; Gen. Ins. Vesp., 1904, p. 22. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 22. WALKER, List Hym. Egypt, 1871, p. 29. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, pt. 21–23, 1884, p. 619. MORICE, Res. Swed. Zool. Exp. Jägerskiöld, pt. 1, 1904, Hym. acul., p. 3. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 60–61 (ethology).

Senegal, Egypt, Eritrea, Southern Arabia, Belgian Congo. (Persia, India, Southern China, Formosa, Malay Archipelago, Queensland).— Type locality: " India."

5*c*. var. **gracilis** (H. DE SAUSSURE).

Eumenes gracilis H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 57 (♀ ♂). C. T. Bingham, Fauna Brit. India, Hym., I, 1897, p. 343, fig. 97 (♀ ♂).

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym. 1812, Pl. viii, fig. 6 (♀ and ♂).

Eumenes esuriens var. *gracilis* H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 132 (♀ ♂). Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 612. Dalla Torre, Cat., IX, Vesp., 1894, p. 23; Gen. Ins. Vesp., 1904, p. 22.

Egypt, White Nile, Senegal, Belgian Congo. (India).— Type locality: "l'Egypte."

6. **Eumenes capensis** A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18 (♀ ♂).

Cape Colony.— Type locality: "Kapland."

7. **Eumenes dilectulus** Walker, List Hym. Egypt, 1871, p. 30 (♂) Dalla Torre, Cat., IX, Vesp., 1894, p. 22; Gen. Ins. Vesp., 1904, p. 22.

Arabia.— Type locality: "Wâdy Gennèh."

8. **Eumenes elegans** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 58; Pl. xi, fig. 3 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 25. Dalla Torre, Cat., IX, Vesp., 1894, p. 23; Gen. Ins. Vesp., 1904, p. 22. C. T. Bingham, Fauna Brit. India, Hym., I, 1897, p. 344.

Arabia. (India).— Type locality: "Djidda en Arabie."

Probably a color variety of *E. caffer* (Linné).

9. **Eumenes femoratus** A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18 (♀ ♂).

Eumenes pulchripennis P. Cameron, Ann. Transvaal Mus., II, pt. 3, 1910, pp. 158 and 160 (♀). (See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

South Africa.— Type locality: "Lobatsi."

10. **Eumenes fülleborniamus** A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18 (♀ ♂).

Zanzibar, Nyasaland.— Type locality: "Sansibar."

11. **Eumenes higletti** G. Meade Waldo, Ann. Mag. Nat. Hist., (8), V, 1910, p. 43 (♀).

Gold Coast.— Type locality: "Tamsoo."

12. **Eumenes langi** J. Bequaert. See p. 84 (♀).

Belgian Congo.— Type locality: Boma.

13. **Eumenes lepeleterii** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 45; Pl. x, fig. 3 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 26. Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 33. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 109. Gribodo, Mem. Ac. Sc. Bologna, Sc. natur., (5), V, 2, 1895, p. 89.

Eumenes formosa var. *lepeletieri* H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 130.

Eumenes lepeletieri F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. Gerstæcker, in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 322; Arch. f. Naturg., XXXVII, 1, 1871, p. 350. Radoszkowsky, Hor. Soc. ent. Rossicæ, XII, 2, 1876, p. 141; Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 632. Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 292. Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 611 (♀ ♂); (2), XV, 1895, p. 170. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 29. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 271; Soc. entomol., XXV, 1910, p. 17. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 219; (7), XII, 1903, p. 67. MORICE, Res. Swed. Zool. Exp. Jägerskiöld, pt. 1, 1904, Hym. acul., p. 3. DALLA TORRE, Gen. Ins. Vesp., 1904, p. 23. P. CAMERON, Ann. Transvaal Mus. II, 3, 1910, p. 158. W. A. SCHULZ, Hymen. Studien, 1905, p. 9.

Eumenes janseii P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 157 (♀).

Eumenes meruensis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 176 (♀) (See G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51; A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

Eumenes granti W. F. KIRBY, Bull. Liverpool Mus., III, 1900, p. 18 (♀); Nat. Hist. of Sokotra by H. O. Forbes, Zool. Hym., 1903, p. 246; Pl. xv, fig. 5 (♀). F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 224 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 23.

The typical form is widely distributed throughout the Ethiopian part of the African continent: Senegal, White Nile, Abyssinia, Somaliland, East Africa, Transvaal, Natal, Angola, Lower Belgian Congo, Southern Arabia, Sokotra; also in Egypt, Syria and on Cyprus.— Type locality: "le Sénégal."

13*a*. var. **alluaudi** (J. PÉREZ).

Eumenes alluaudi J. PÉREZ, Ann. Soc. ent. France, LXIV, 1895, p. 206 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 21. P. CAMERON, Trans. Linn. Soc. London, (2) XII, Zool., pt. 1, 1907, p. 71. G. MEADE WALDO, Trans. Linn. Soc. London, (2), XV, Zool., pt. 1, 1912, p. 43.

Seychelles Islands.— Type locality: "Mahé."

13*b*. var. **asinus** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 24 (♀).

Eumenes asina H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 59; Pl. XI, fig. 1 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. DALLA TORRE, Cat., IX, Vesp., 1894, p. 18; Gen. Ins. Vesp., 1904, p. 21.

Senegal.— Type locality: "le Sénégal."

13*c*. var. **concinnus** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes concinnus H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 144 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 25. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 293 (♀). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 611 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 22; Gen. Ins. Vesp., 1904, p. 22.

Eumenes sanguinolenta GERSTÆCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 464; Pl. XXX, fig. 3 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 31; Gen. Ins. Vesp., 1904, p. 24. F. KOHL, Jahrb. Hamburg. Wiss. Anst., X, 2, (1892), 1893, p. 189 (♀).

Eumenes spilocera P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 159 (♀). (See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

Nubia, Abyssinia, Mozambique, Transvaal.— Type locality: "la Nubie."

13*d*. var. **guerini** (H. DE SAUSSURE).

Eumenes guerini H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 62 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 28. DALLA TORRE, Cat., IX, Vesp., 1894, p. 25; Gen. Ins. Vesp., 1904, p. 23.

Eumenes sakalava H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 235 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 24.

Eumenes lepelletieri var. *sakalavus* (H. de Saussure) A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Madagascar.— Type locality: " Madagascar."

13*e*, var. **hottentottus** (H. de Saussure) A. v. Schulthess, Deutsche entom. Zeitschr., 1914, p. 291 (♀ ♂).

Eumenes hottentotta H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 63 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. Dalla Torre, Cat., IX, Vesp., 1894, p. 25; Gen. Ins. Vesp., 1904, p. 23. A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp. (1907–08), IV, Lf. 10, 1912, p. 292; Soc. entomol., XXV, 1910, p. 24.

Eumenes dyscheroides Gribodo, Mem. Ac. Sc. Bologna, Sc. natur., (5), V, 2, 1895, p. 93 (♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 22.

Eumenes lepelletieri var. *dyscheroides* A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17.

Cape Colony, Natal, Delagoa Bay, Belgian Congo.— Type locality: " le Cap de Bonne-Espérance."

13*f*. var. **pensilis** (H. de Saussure) A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes pensilis H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 155; Pl. iv, fig. 10; Pl. xvii, fig. 7 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 234. Dalla Torre, Cat., IX, Vesp., 1894, p. 28; Gen. Ins. Vesp., 1904, p. 24. A. v. Schulthess, Reise Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 71.

Madagascar.— Type locality: " Fianarantsoa."

13*g*. var. **stuhlmanni** A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18 (♀).

German East Africa, eastern Belgian Congo.— Type locality: " Deutsch Ost-Afrika."

13*h*. var. **tessmanni** A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342.

Eumenes cameruna F. Kohl, *in litt.* (*teste* A. v. Schulthess).

Spanish Guinea.— Type locality: " Spanish Guinea, Benito."

14. **Eumenes leptogaster** Walker, List Hym. Egypt, 1871, p. 30 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23.

Arabia.— Type locality: " Wâdy Ferran."

15. **Eumenes lucasius** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 68 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. Dalla Torre, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23. C. T. Bingham, Ann. Mag. Nat. Hist., (7), X, 1902, p. 220. A. v. Schulthess, Soc. entomol., XXV, 1910, p. 24 (♀ ♂); Ark. f. Zool., VIII, No. 17, 1913, p. 14. P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 178 (♀ ♂); Ann. Transvaal Mus., II, 3, 1910, pp. 156 and 160.

Rethus broomi P. Cameron, Rec. Albany Mus., I, 2, 1904, p. 110 [See G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XIV, 1914, p. 404].

Eumenes schultzeanus A. v. Schulthess, Soc. entomol., XXV, 1910, p. 19 (♀ ♂).

Abyssinia, East Africa, Zanzibar, Nyasaland, Bechuanaland, Transvaal, Cape Colony.— Type locality: " l'Abyssinie."

16. **Eumenes maculinodus** P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 156 (♂).

Transvaal.— Type locality: " Pretoria."

Perhaps the male of *E. ornativentris* Cameron.

17. **Eumenes maxillosus** (de Geer) H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 153 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554. Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 393. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 28 (ethology). A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 271; Reise Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 71; Zool. Jahrb. Abt. f. Syst., XXVII, Heft 5, 1909, p. 445; Soc. entomol., XXV, 1910, p. 17; Wiss. Ergebn. D. Z. Afrika Exp. (1907–08), IV, Lf. 10, 1912, p. 292; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342; Deutsche entom. Zeitschr., 1914, p. 290. C. T. Bingham, Ann. Mag. Nat. Hist., (7), X, 1902, p. 219; Trans. Zool. Soc. London, XIX, 2, 1909, p. 181. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 224. P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 177; Ann. Transvaal Mus., II, 3, 1910, p. 156. W. A. Schulz, Berliner ent. Zeitschr., LVII, 1912, pp. 60 and 87. F. Maidl, Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Heft 4, 1913, Abt. I, p. 558. L. Schuster, Zeitschr. wiss. Insektenbiol., VII, 1911, p. 27 (ethology). G. Mantero, Ann. Mus. civ. Genova, XLVI, (1914), 1915, pp. 308 and 327. A. Tullgren, Ark. f. Zool., I, 1904, p. 445.

Vespa maxillosa de Geer, Mém. Hist. Ins., III, 1773, p. 577; Pl. xxix, figs. 1–2.

Sphex tinctor Christ, Naturg. d. Insect., 1791, p. 311; Pl. xxxi, fig. 1.

Eumenes tinctor H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 49 (♀ ♂). F. Smith, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 128 (ethology); Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27; Pl. vi, fig. 1. Gueinzius, Trans. Ent. Soc. London, (2), V, 1858, p. 9 (ethology). Gerstæcker, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 462; in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 321; Arch. f. Naturg., XXXVII, 1, 1871, p. 330. v. Heyden, Berliner ent. Zeitschr., XI, 1867, p. 398. Walker, List Hym. Egypt, 1871, p. 29. Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 630 (ethology). Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 293; Mem. Ac. Sc. Bologna, Sc. natur., (5), IV, 1894, p. 62; (5), V, 1895, p. 91. Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 609 (ethology); (2), X, 1891, p. 959. A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 19. W. L. Distant, A Naturalist in the Transvaal, 1892, p. 210. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343; in O. Baumann, Durch Massailand zur Nilquelle, 1894, p. 350. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 109. Morice, Res. Swed. Zool. Exp. Jägerskiöld, pt. I, 1904, Hym. acul., p. 3. E. Zavattari, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 548, 1907, p. 1; No. 555, 1907, p. 3. R. du Buysson, Bull. Soc. ent. France, 1908, p. 135; in A. Chevalier, L'Afrique centrale française, 1908, p. 707; Résultats scientif. Voy. Afrique d'Ed. Foá, 1908, p. 593; Act. Soc. Linn. Bordeaux, LXIV, 1910, p. 227. E. Roubaud, C. R. Ac. Sc. Paris, CLIII, 1911, pp. 476–480 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 43–60 (ethology).

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. viii, fig. 4.

Eumenes savignyi Guérin, Icon. Règne Animal, II, Atlas, 1835, Pl. lxxii, figs. 4 and 4 *a–d*; III (Texte), Ins., 1844, p. 446; in Lefebvre, Voy. en Abyssinie, IV, Zool., pt. 6, 1848, p. 363. Spinola, Ann. Soc. ent. France, VII, 1838, p. 503 (♀ ♂). Walker, List Hym. Egypt, 1871, p. 29.

Vespa guineensis FABRICIUS, Entom. Syst., II, 1793, p. 277 (see W. A. Schulz, Berliner ent. Zeitschr., LVII, 1912, p. 87).

Zethus guineensis FABRICIUS, Syst. Piez., 1804, p. 283.

Eumenes erythrospila P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 178 (♀ ♂). (See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14, and G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51).

The typical "*maxillosus*" is widely distributed over the Ethiopian part of the African continent and the Malagasy subregion: Tripoli, Egypt, White Nile, Abyssinia, Somaliland, East Africa, Mozambique, Transvaal, Natal, Nyasaland, Angola, Belgian Congo, Mt. Ruwenzori (3000–7000 ft.), Gaboon, Spanish Guinea, Liberia, Upper Niger, Senegal, Mauritania, Central Sahara, Madagascar, Comoro Islands, Southern Arabia.— Type locality: "Surinam."

17*a*. var. **dimidiatipennis** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes dimidiatipennis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 51 (♀ ♂); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 154. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 631. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 610; (2), XIX, 1898, p. 593. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 25. WALKER, List Hym. Egypt, 1871, p. 29. RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 2, 1876, p. 141. A. v. SCHULTHESS, Entom. Nachr., XIX, 1893, p. 18. W. F. KIRBY, Nat. Hist. of Sokotra by H. O. Forbes, Zool. Hym., 1903, p. 246. FOX, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554. MORICE, Res. Swed. Zool. Exp. Jägerskiöld, pt. I, 1904, Hym. acul., p. 3; Novit. Zoolog., XX, 3, 1913, p. 599; XXIII, 2, 1916, p. 242. C. T. BINGHAM, Fauna of Brit. India, Hym., I, 1897, p. 342, fig. 96; Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 109. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 224. R. DU BUYSSON, Bull. Soc. ent. France, 1908, pp. 134 and 135. F. MAIDL., Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Abt. I, Heft 4, 1913, p. 558. DALLA TORRE, Cat., IX, Vesp., 1894, p. 22; Gen. Ins. Vesp., 1904, p. 22.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. VIII, fig. 5 (♀ and ♂).

Egypt, White Nile, Abyssinia, Somaliland, Sokotra Island, Central Sahara, Southern Algeria (Ain Sefra), Madagascar (?), Southern Arabia, India, Syria.— Type locality: "Djidda."

17*b*. var. **fenestralis** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂); Deutsche entom. Zeitschr., 1914, p. 290.

Eumenes fenestralis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 53; Pl. X, fig. 6 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. DESMAREST, in Chenu, Encycl. Hist. nat. Animaux, 1860, p. 143, fig. 123. v. HEYDEN, Berliner ent. Zeitschr., XI, 1867, p. 398. WALKER, List Hym. Egypt, 1871, p. 29. G. GRIBODO, Ann. Mus civ. Genova, XXI, 1884, p. 293; Mem. Ac. Sc. Bologna, Sc. natur., (5), V, 2, 1895, p. 92. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. DALLA TORRE, Cat., IX, Vesp., 1894, p. 24; Gen. Ins. Vesp., 1904, p. 22. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 29. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 271. C. T. BINGHAM, Trans. Zool. Soc. London, XIX, 2, 1909, p. 181.

Eumenes fenestratus RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203.

Eumenes variventris P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 180 (♂) [See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14; G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51].

Senegal, Belgian Congo, Angola, East Africa, Zanzibar, Mt. Ruwenzori (7000 ft.). — Type locality: "le Congo."

17*c*. var. **petiolatus** (Fabricius).

Eumenes petiolata (Fabricius) H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 47 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. Dalla Torre, Cat., IX, Vesp., 1894, p. 28; Gen. Ins. Vesp., 1904, p. 24.

Vespa petiolata Fabricius, Spec. Insect., I, 1781, p. 467.

Eumenes latreillei H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 51 (♀).

This Oriental and Australian variety was recorded by Smith from the Cape of Good Hope, probably by mistake; the record, however, is reproduced in Dalla Torre's List.

17*d*. var. **pulcherrimus** A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17 (♀).

East Africa, from the Equator to Natal. Type locality: "Ost-Afrika."

17*e*. var. **reginus** (H. de Saussure) A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes regina H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 49; Pl. x, figs. 8, 8 *a–b* (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 154 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 28. Dalla Torre, Cat., IX, Vesp., 1894, p. 31; Gen. Ins. Vesp., 1904, p. 24. A. v. Schulthess, Reise Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 71, fig. 9 (ethology).

Eumenes kohli H. Brancsik, Jahresheft naturw. Ver. Trencsiner Comit., XIII–XIV, 1891, p. 159 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23.

Madagascar, Nossi Bé.— Type locality: "Madagascar."

17*f*. var. **tropicalis** (H. de Saussure) A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342; Deutsche entom. Zeitschr., 1914, p. 290.

Eumenes tropicalis H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 54 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 32; Gen. Ins. Vesp., 1904, p. 25. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. A. Tullgren, Ark. f. Zool., I, 1904, p. 445.

Eumenes tropica F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27.

Senegal, Cameroon, Spanish Guinea, Belgian Congo.— Type locality: "le Sénégal."

18. **Eumenes melanosomus** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 61; Pl. xii, fig. 1 (♀ ♂). Maindron, Ann. Soc. ent. France, (6), II, 1882, p. 272. Dalla Torre, Cat., IX, Vesp., 1894, p. 27; Gen. Ins. Vesp., 1904, p. 23. A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 25.

Distribution of the typical form: Tropical East and West Africa; (Java?).— Type locality: "Java."

18*a*. var. **æthiopicus** (H. de Saussure) A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18 (♀).

Eumenes æthiopica H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 62 (♀).

F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. Dalla Torre, Cat., IX, Vesp., 1894, p. 17; Gen. Ins. Vesp., 1904, p. 21. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343.

Gaboon, Belgian Congo.— Type locality: "le Congo."

18*b*. var. **affinis** A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18 (♀ ♂).

Eumenes xanthaspis P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 175 (♂) (See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.)

German East Africa.— Type locality: "Dar-es-Salaam."

18*c*. var. **aterrimus** A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18 (♀).

Eumenes aterrima A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lf. 10, 1912, p. 292 (♂).

Togo, Cameroon, Belgian Congo, Mt. Ruwenzori (1900 m.), Nyasaland, Zanzibar.— Type locality: "Togo."

18*d*. var. **decipiens** (Kirby) A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342 (♀ ♂); Deutsche entom. Zeitschr., 1914, p. 291.

Eumenes decipiens W. F. Kirby, Ann. Mag. Nat. Hist., (6), XVIII, 1896, p. 265. Dalla Torre, Gen. Ins. Vesp., 1904, p. 22.

Eumenes gracillima A. Tullgren, Ark. f. Zool., I, 1904, p. 445; Pl. xxiii, fig. 8 (♂).

Eumenes moseri W. A. Schulz, Spolia Hymenopterologica, 1906, p. 315, figs. 11 *a–c* (♀); Berliner ent. Zeitschr., LI, Heft 4, 1907, p. 325.

Sierra Leone, Cameroon, Fernando Po, Spanish Guinea, Ogowe River, Belgian Congo.— Type locality: "River Ogové."

18*e*. var. **distinctus** (H. de Saussure) A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17 (♂).

Eumenes distinctus H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 143 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. Dalla Torre, Cat., IX, Vesp., 1894, p. 22; Gen. Ins. Vesp., 1904, p. 22.

Eumenes walkeri C. Ritsema, Tijdschr. v. Entom., XVII, 1874, p. 199; Pl. xi, fig. 7 (♂). A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 19; Pl. i, fig. 8 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 33; Gen. Ins. Vesp., 1904, p. 25. W. A. Schulz, Berliner ent. Zeitschr., LI, Heft 4, 1907, p. 313, fig. 3 (♂).

Belgian Congo.— Type locality: "l'Afrique."

18*f*. var. **longirostris** (Gerstæcker) A. v. Schulthess, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes longirostris Gerstæcker, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 462 (♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 462; Pl. xxx, fig. 1. Dalla Torre, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23. Gribodo, Mem. Ac. Sc. Bologna, Sc. natur., (5), V, 2, 1895, p. 92 (♀). A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 271.

Eumenes erythraspis P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 179 (♀). Synonym according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Eastern Belgian Congo (Semliki River), German East Africa, Mozambique.— Type locality: "Mossambique."

19. **Eumenes ornativentris** P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 157 (♀).

Transvaal.— Type locality: "Waterval."

Is possibly the female of *E. maculinodus* Cameron.

20. **Eumenes peringeyanus** A. v. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 2 (♀).

Cape Colony.— Type locality: "Kapkolonie."

21. **Eumenes phthisicus** GERSTÆCKER, Monatsb. k. Ak. Wiss. Berlin, 1857, p. 463 (♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 463; Pl. xxx, fig. 2 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 28; Gen. Ins. Vesp., 1904, p. 24. A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17.

Mozambique.— Type locality: "Mossambique."

22. **Eumenes rendalli** C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 220 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 24.

Nyasaland, Transvaal.— Type locality: "Fort Johnston, Nyasaland."

23. **Eumenes rufolineatus** P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 206 (♂); Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 181; Ann. Transvaal Mus., II, 3, 1910, p. 156.

Cape Colony, Transvaal.— Type locality: "Brak Kloof."

24. **Eumenes signicornis** WALKER, List Hym. Egypt, 1871, p. 30.

Eumenes signaticornis DALLA TORRE, Cat., IX, Vesp., 1894, p. 32; Gen. Ins. Vesp., 1904, p. 25.

Eritrea.— Type locality: "Massowah."

25. **Eumenes sulcigaster** GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 295 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 32; Gen. Ins. Vesp., 1904, p. 25.

Abyssinia.— Type locality: "Giagaguè, Scioa."

15. **Pachymenes** H. DE SAUSSURE

Et. fam. Vesp., I, Eum., 1852, p. 73.

Eudiscœlius H. FRIESE, Zeitschr. syst. Hym. Dipt., IV, 1904, p. 16.

Euchalcomenes R. E. TURNER, Trans. Ent. Soc. London, 1908, p. 90.

Genotype: *Pachymenes sericeus* H. de Saussure, 1852.

1. **Pachymenes astutus** (F. KOHL).

Labus astutus F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 230 and 245; Pl. IV, fig. 17; Pl. VI, figs. 2 and 24; Pl. VII, figs. 7 and 17 (♀).

Cape Colony, Belgian Congo.— Type locality: "Kapland."

2. **Pachymenes congensis** J. BEQUAERT. See p. 88 (♀ ♂).

Belgian Congo.— Type locality: Banana.

3. **Pachymenes crassinodus** (P. CAMERON).

Eumenes crassinodus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 181 (♀).

Labus crassinodus G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51.

Nortonia crassinoda A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, pp. 14 and 18.

East Africa.— Type locality: "Kilimandjaro: Kibonoto, 1000–1300 m."

4. **Pachymenes curvirufolineatus** (P. CAMERON).

Odynerus curvirufolineatus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 191 (♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 496. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 17.

East Africa.— Type locality: "Kilimandjaro: lower Kibonoto."

5. **Pachymenes eumenoides** (F. Smith).

Odynerus eumenoides F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 71 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 66; Gen. Ins. Vesp., 1904, p. 44. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Ann. Mag. Nat. Hist., (7), XII, 1903, p. 68.

Nortonia eumenoides G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 503.

Natal, Transvaal, Southern Arabia.— Type locality: "Port Natal."

6. **Pachymenes finitimus** (F. Kohl).

Labus finitimus F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 229 and 243; Pl. vi, fig. 22; Pl. vii, figs. 1 and 15 (♀).

Cape Colony.— Type locality: "Kapland."

7. **Pachymenes fraterculus** (F. Kohl).

Labus fraterculus F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 225 and 243; Pl. iv, fig. 27; Pl. vi, figs. 8, 10, and 25; Pl. vii, figs. 9 and 24 (♀ ♂).

Sokotra Island.— Type locality: "Ras Shoab."

8. **Pachymenes lævis** (A. v. Schulthess).

Nortonia lævis A. v. Schulthess, Verh. k. k. z. bot. Ges. Wien, LIII, 1903, p. 363 (♂); Zeitschr. syst. Hym. Dipt., IV, 1904, p. 279. Dalla Torre, Gen. Ins. Vesp., 1904, p. 32. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 241 (♂).

San Thomé Island.— Type locality: "Insel St. Thomé."

9. **Pachymenes nigritus** (F. Kohl).

Labus nigritus F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 228 and 244; Pl. vi, figs. 6 and 21; Pl. vii, figs. 3 and 14 (♀).

Cape Colony.— Type locality: "Kapland."

10. **Pachymenes rufoquadripustulatus** (P. Cameron).

Odynerus rufoquadripustulatus P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 189 (♀). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53.

Nortonia rufoquadripustulata A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

Mt. Kilimandjaro.— Type locality: "Kilimandjaro: Kibonoto, 1300–1900 m."

11. **Pachymenes schulthessianus** (H. de Saussure).

Nortonia schulthessiana H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 157; Pl. xvii, fig. 8 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 109; Gen. Ins. Vesp., 1904, p. 32. A. v. Schulthess, Zeitschr. syst. Hym. Dipt., IV, 1904, p. 279. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 233 and 244; Pl. iv, fig. 26; Pl. vi, figs. 1 and 28; Pl. vii, figs. 12 and 18 (♂).

Madagascar, Nossi Bé.— Type locality: "Madagascar."

12. **Pachymenes socotræ** (F. Kohl).

Labus socotræ F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 226 and 243; Pl. vi, figs. 11 and 16; Pl. vii, fig. 25 (♀).

?*Icaria grossepunctata* W. F. Kirby, Bull. Liverpool Mus., III, 1900, p. 20 (♀); Nat. Hist. of Sokotra by H. O. Forbes, Zool. Hym., 1903, p. 249; Pl. xvi, fig. 5 (♀).

Sokotra Island.— Type locality: " Ras Shoab."

13. **Pachymenes transiens** (F. Kohl).

Labus transiens F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 231 and 244; Pl. iv, fig. 18; Pl. vi, fig. 12; Pl. vii, fig. 8 (♀).

South Africa.— Type locality: " Montagu Pass."

16. **Pseudochilus** H. de Saussure

Et. fam. Vesp., III, Suppl., 1854, p. 321.

Genotype: *Pterochilus glabripalpis* H. de Saussure, 1852.

1. **Pseudochilus glabripalpis** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 321 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 109; Gen. Ins. Vesp., 1904, p. 57; Pl. iv, figs. 6 *a–c*.

Pterochilus glabripalpis H. de Saussure, Et. fam. Vesp, I, Eum., 1852, p. 239; Pl. xx, fig. 7 and 7 *a–b* (♀). F. Smith; Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 86.

Senegal, Gambia.— Type locality: " le Sénégal."

17. **Nortonia** H. de Saussure

Entom. Zeitg. Stettin, XXX, 1869, p. 53.

Genotype: *Odynerus intermedius* H. de Saussure, 1852.

1. **Nortonia aberratica** (Morice).

Odynerus aberraticus F. D. Morice, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 613 (♂); Res. Swed. Zool. Exp. Jägerskiöld, pt. I, No. 14, 1904, Hym. Acul., p. 4 (♂).

Nortonia moricei F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, I, 1907, pp. 233 and 245; Pl. vi, figs. 18 and 20; Pl. vii, figs. 10 and 19 (♂). F. Maidl, Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Heft 4, 1913, Abt. 1, p. 558, fig. (♀).

Egypt (Aba Island, Kairo).— Type locality: " Aba Island."

The types of *O. aberraticus* Morice and *N. moricei* Kohl were collected the same day and in the same locality; a comparison of the descriptions leaves no doubt that both refer to one species.

2. **Nortonia acarophila** J. Bequaert. See p. 97 (♀).

Belgian Congo.— Type locality: Faradje.

3. **Nortonia ægyptiaca** (H. de Saussure).

Odynerus œgyptiacus H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 210; Pl. ii, fig. 19 (♀). Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 664 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 50; Gen. Ins. Vesp., 1904, p. 39.

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. viii, fig. 15 (♀).

Egypt.— Type locality: " Egypte."

Perhaps the same species as *N. heydeniana* (Saussure).

4. **Nortonia bisuturalis** (H. de Saussure).

Odynerus bisuturalis H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 127 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Dalla Torre, Cat., IX, Vesp., 1894, p. 57; Gen. Ins. Vesp., 1904, p. 41.

Labus bisuturalis G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 501 (♂).

(Senegal ?), Belgian Congo.— Type locality: " le Sénégal? "

5. **Nortonia braunsii** F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, I, 1907, pp. 234 and 245; Pl. iv, figs. 19 and 31; Pl. vi, figs. 9, 14, and 19; Pl. vii, fig. 5 (♀ ♂).

Cape Colony, Belgian Congo.— Type locality: " Algoabai."

6. **Nortonia caffra** (G. Meade Waldo).

Labus caffra G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 453 (♀).

Zululand.— Type locality: " Zulu."

7. **Nortonia difformis** (H. de Saussure).

Odynerus difformis H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 145; Pl. xvi, figs. 11 and 11*a* (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Dalla Torre, Cat., IX, Vesp., 1894, p. 64; Gen. Ins. Vesp., 1904, p. 44.

Labus difformis G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 502.

?Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. viii, fig. 11 (♂).

Senegal.— Type locality: " le Sénégal."

8. **Nortonia fragosa** F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 237 and 246; Pl. viii, figs. 23 to 27 (♂).

Belgian Congo.— Type locality: " Boma."

9. **Nortonia gambiensis** (G. Meade Waldo).

Labus gambiensis G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 454 (♀).

Gambia, Nyasaland.— Type locality: " Duniajoe, Gambia."

10. **Nortonia heydeniana** (H. de Saussure).

Odynerus heydenianus H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 211; Pl. ii, fig. 20 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 72; Gen. Ins. Vesp., 1904, p. 46. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 486.

Abyssinia.— Type locality: " Massana."

Probably a synonym of *N. ægyptiaca* (Saussure).

11. **Nortonia kibonotensis** (P. Cameron).

Odynerus kibonotensis P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 192 (♀). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

Nortonia kibonotoensis A. v Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

East Africa.— Type locality: " Kilimandjaro: Kibonoto, 1000–1200 m."

12. **Nortonia maculiscapa** (P. Cameron).

Odynerus maculiscapus P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 194 (♂). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 15.

East Africa.— Type locality: " Kilimandjaro: Kibonoto, 1300–1900 m."

13. **Nortonia malelensis** J. Bequaert. See p. 109 (♂).

Belgian Congo.— Type locality: Malela.

14. **Nortonia morula** F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 236 and 246; Pl. iv, figs. 23 and 25; Pl. vi, figs. 7 and 15; Pl. vii, fig. 16 (♀ ♂).

Gaboon, Belgian Congo.— Type locality: " Gabun."

15. **Nortonia parvula** (H. DE SAUSSURE).

Leptochilus parvulus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 237 (♀ ♂) (without description).

Odynerus parvulus H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 321.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. VIII, fig. 14 (♀ ♂).

Odynerus invisus DALLA TORRE, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47.

Egypt.— Type locality: " Egypte."

The species is distinct from *Odynerus parvulus* LEPELETIER, Hist. nat. Ins. Hym., II, 1841, p. 631, which belongs to the subgenus *Rygchium*.

16. **Nortonia polydora** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 235 and 245; Pl. IV, fig. 30; Pl. VI, figs. 13 and 17; Pl. VII, figs. 4 and 20 (♀).

Senegambia, Belgian Congo.— Type locality: " Senegambien."

17. **Nortonia soror** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 237 and 246; Pl. IV, figs. 22 and 24; Pl. VI, fig. 4 (♂).

Orange Free State.— Type locality: " Bothaville."

18. **Nortonia tricarinulata** J. BEQUAERT. See p. 99 (♀ ♂).

Belgian Congo.— Type locality: Lubutu.

18. **Ancistrocerus** WESMAEL.

Bull. Ac. Sc. Belgique, III, 1836, p. 45 (as a subgenus). WESTWOOD, Introd. to Mod. Class of Ins., II, Synopsis, 1840, p. 84 (as a genus).

Genotype: *Vespa parietum* Linné, 1758 (= *Vespa parietina* Linné, 1761).

Ancistrocerus parietum (LINNÉ) is a Palearctic species which was erroneously recorded from West Africa by Dalla Torre, Gen. Ins. Vesp., 1904, p. 51.

1. **Ancistrocerus biphaleratus** (H. DE SAUSSURE).

Odynerus biphaleratus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 134; Pl. XVI, fig. 2 (♀ ♂); III, Suppl., 1854, p. 204. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 677 (♀ ♂). C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110. DALLA TORRE, Cat., IX, Vesp., 1894, p. 56; Gen. Ins. Vesp., 1904, p. 41.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. IX, fig. 6 (♀).

Southern Arabia, Egypt.— Type locality: " l'Egypte."

2. **Ancistrocerus budongo** (G. MEADE WALDO).

Odynerus budongo G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 489 and 498 (♀).

Uganda, Belgian Congo.— Type locality: " Budongo Forest, Unyoro."

3. **Ancistrocerus capensis** (H. DE SAUSSURE).

Odynerus capensis H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 214 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 71. DALLA TORRE, Cat., IX, Vesp., 1894, p. 58; Gen. Ins. Vesp., 1904, p. 41. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 221.

Cape Colony, Transvaal.— Type locality: " le Cap de Bonne-Espérance."

4. **Ancistrocerus gowdeyanus** (G. MEADE WALDO).

Odynerus gowdeyanus G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 457 (♂); Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Uganda.— Type locality: " Entebbe."

5. **Ancistrocerus imbecillus** (H. de Saussure).

Odynerus imbecillus H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 126 (♂); III, Suppl., 1854, p. 197. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Dalla Torre, Cat., IX, Vesp., 1894, p. 73; Gen. Ins. Vesp., 1904, p. 47.

Sierra Leone (originally described from Java).— Type locality: " Sierra Leone."

6. **Ancistrocerus impunctatus** (Spinola).

Odynerus impunctatus Spinola, Ann. Soc. ent. France, VII, 1838, p. 503 (♂). H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 213 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 214 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 69. Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 677 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 73; Gen. Ins. Vesp., 1904, p. 47.

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 5 (♂).

Egypt.— Type locality: " Egypte."

7. **Ancistrocerus inconstans** (H. de Saussure).

Odynerus inconstans H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 217; Pl. ii, fig. 24 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

Abyssinia.— Type locality: " Abyssinie."

8. **Ancistrocerus kisangani** J. Bequaert. See p. 115 (♂).

Belgian Congo.— Type locality: Stanleyville.

9. **Ancistrocerus lineaticollis** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 193 (♀ ♂).

Odynerus lineaticollis G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 15.

East Africa.— Type locality: " Meru, rain forest, 3500 m."

9*a*. var. **rufopictus** (G. Meade Waldo).

Odynerus lineaticollis var. *rufopictus* G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

Africa.— Type locality: unknown.

10. **Ancistrocerus lufiræ** (G. Meade Waldo).

Odynerus lufiræ G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 490 and 499 (♀ ♂).

Southeastern Belgian Congo (Katanga).— Type locality: " Kambove, 4000-5000 ft."

11. **Ancistrocerus massaicus** (P. Cameron).

Odynerus massaicus P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 193 (♀). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

East Africa, Belgian Congo.— Type locality: " Kilimandjaro: Kibonoto, 1300-1900 m."

12. **Ancistrocerus massanensis** (H. de Saussure).

Odynerus massanensis H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 213; Pl. ii, figs. 22 and 22 *t* (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490; Pl. xci, fig. 1 (♂).

Odynerus massauensis Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 621. Dalla Torre, Cat., IX, Vesp., 1894, p. 77; Gen. Ins. Vesp., 1904, p. 49.

Abyssinia.— Type locality: " Massana."

13. **Ancistrocerus neavei** (G. Meade Waldo).

Odynerus neavei G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 490 and 500 (♀ ♂).

Mt. Ruwenzori (1600–8500 feet; Uganda and Belgian Congo).— Type locality: " N. Ruwenzori, 6000–8500 ft."

14. **Ancistrocerus neuvillei** (R. du Buysson).

Odynerus neuvillei R. du Buysson, Rev. d'Ent. Caen, XXV, 1906, p. 109 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

British East Africa.— Type locality: " Escarpment."

15. **Ancistrocerus pharao** (H. de Saussure).

Odynerus pharao H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 212; Pl. ii, fig. 21 (♀ ♂). Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 669 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 89; Gen. Ins. Vesp., 1904, p. 51.

Egypt.— Type locality: " Egypte."

16. **Ancistrocerus roubaudi** (J. Bequaert).

Odynerus roubaudi J. Bequaert, Bull. Soc. ent. France, 1916, p. 90 (♀ ♂). E. Roubaud, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 36 and 37 (ethology).

Upper Senegal-Niger.— Type locality: " Koulikoro." [1]

This is probably only a color variety of *A. massanensis* (Saussure); however, I was unable to compare it with that species.

17. **Ancistrocerus striativentris** (P. Cameron).

Nortonia striativentris P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 194 (♂).

Odynerus striativentris G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 15.

East Africa.— Type locality: " Kilimandjaro: Kiboscho, 3000–4000 m."

18. **Ancistrocerus zairensis** J. Bequaert. See p. 117 (♀ ♂).

Belgian Congo.— Type locality: Banana.

19. **Ancistrocerus zebra** (H. de Saussure).

Odynerus zebra H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 215; Pl. ii, fig. 23 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 105; Gen. Ins. Vesp., 1904, p. 57. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

Abyssinia.— Type locality: " Simen."

19. **Montezumia** H. de Saussure

Et. fam. Vesp., I, Eum., 1852, p. 87.

Genotype: *Odynerus ? azurescens* Spinola, 1851, var. *rufidentata* (Saussure), 1852.

1. **Montezumia bimaculata** G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 455 (♀).

North East Rhodesia.— Type locality: " on road Fort Jameson to Lundazi (4000 ft.)."

This species belongs probably to the genus *Parazumia* H. de Saussure.

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[1] The holo- and allotype of *A. roubaudi* (J. Bequaert) have been deposited in the American Museum.

20. **Odynerus** Latreille

Hist. nat. Crust. Ins., III, 1802, p. 362.
Genotype: *Vespa spinipes* Linné, 1758.

The following species of *Odynerus* were erroneously recorded from the Ethiopian region: *O. bicinctus* (Fabricius) from the islands of the Pacific (South Africa, according to Fabricius, Spec. Insect., I, 1781, p. 465); *O. herrichii* Saussure from the Palearctic region (West Africa, according to Dalla Torre, Gen. Ins. Vesp., 1904, p. 46); *O. nudus* Morawitz from Central Asia (Central Africa, according to Dalla Torre, *op. cit.*, 1904, p. 50); *O. miniatus* Saussure from the East Indies (Senegal, according to Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 73); *O. rectus* Dalla Torre from Spain (Abyssinia, according to Dalla Torre, *op. cit.*, 1904, p. 52); *O. mauritanicus* (Lepeletier) from Algeria (Mauritius, according to Dalla Torre, Cat., IX, Vesp., 1894, p. 77). *O. rhynchiformis* Saussure, which was described from the Cape Colony (H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 174), is a synonym of *O. crenatus* Lepeletier, and inhabits the Mediterranean subregion (H. de Saussure, *ibid.*, III, Suppl., 1854, pp. 231 and 236). *O. limbatus* (Saussure) is reported from Madagascar by F. Smith (Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 48) and Dalla Torre; but the exact locality of this species is unknown; it is probably Asiatic (see H. de Saussure, Smithsonian Misc. Coll., XIV, No. 254, 1875, p. 143).

Vespa squamigera Fabricius, Syst. Piez., 1804, p. 267, from Guinea, may have been an *Odynerus*.

Subgenus 1. **Odynerus** Latreille, *sensu stricto*

Epipone Kirby and Spence, Introd. to Entom., I, 1818, p. 349 (*nec Epipona* Latreille, 1802).

Oplopus Wesmael, Bull. Ac. Sc. Belgique, III, 1836, p. 45 (*nec Hoplopus* Laporte, 1832).

Oplomerus Westwood, Introd. to Mod. Class. of Ins., II, Synopsis, 1840, p. 84 (*nec Oplomerus* Dejean, 1833).

Hoplomerus C. G. Thomson, Skandinaviens Hymenoptera, III, 1. Vespa L., 1874, pp. 35 and 41 (as a genus).

Type: *Vespa spinipes* Linné, 1758.

1. **Odynerus adonis** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 498 and 519 (♀).

Belgian Congo (Katanga).— Type locality: "Lufira River, 3500 feet."

Probably a synonym of *Pterochilus versicolor* A. v. Schulthess.

2. **Odynerus alexandrinus** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 225 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, pp. 765 and 782 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 51; Gen. Ins. Vesp., 1904, p. 39.

Oplopus alexandrinus Radoszkowsky, Hor. Soc. ent. Rossicæ, XII, 1876, p. 144.

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. viii, fig. 10 (♀).

Egypt.— Type locality: "l'Egypte."

3. **Odynerus eversmanni** (Radoszkowsky) Ed. André, Spéc. Hym. Eur.

Algér., II, fasc. 21–23, 1884, p. 783 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 66; Gen. Ins. Vesp., 1904, p. 44.

Oplopus eversmanni Radoszkowsky, Hor. Soc. ent. Rossicæ, XII, 1876, p. 144 (♀).

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 8 (♀).

Egypt.— Type locality: " Egypte."

4. **Odynerus ferruginosus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 299 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 68; Gen. Ins. Vesp., 1904, p. 45. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Cape Colony.— Type locality: " le Cap de Bonne-Espérance."

5. **Odynerus gestroi** (Magretti).

Rygchium gestroi Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 614 (♀).

Rhynchium gestroi Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 34.

Oriental Sudan.— Type locality: " Ain."

Perhaps the same as *O. spiniger* A. v. Schulthess var. *maculatus* A. v. Schulthess.

6. **Odynerus quartinæ** Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 290 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 92; Gen. Ins. Vesp., 1904, p. 52. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

East Africa.— Type locality: " Let-Marefià."

7. **Odynerus savignyi** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 226 (♀); III, Suppl., 1854, p. 307. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. Dalla Torre, Cat., IX, Vesp., 1894, p. 95; Gen. Ins. Vesp., 1904, p. 54.

Arabia.— Type locality: " Djidda."

8. **Odynerus senegalensis** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 219; Pl. xix, fig. 7 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 73. Dalla Torre, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Senegal.— Type locality: " le Sénégal."

9. **Odynerus simplex** C. T. Bingham, Ann. Mag. Nat. Hist., (7), X, 1902, p. 222 (♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 54. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 498.

Transvaal.— Type locality: " Pretoria."

10. **Odynerus spiniger** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 73, fig. (♀ ♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 498 and 518.

Katanga, Somaliland, Kalahari, Bechuanaland, Damaraland, Cape Colony, Eritrea.— Type locality: " Willowmore."

10*a*. var. **maculatus** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 74. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 498.

Type locality: not given.

Perhaps a synonym of *O. gestroi* (Magretti).

11. **Odynerus zebroides** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 498 and 518 (♀ ♂).

British East Africa.— Type locality: "Ongotta, Nairowa."

Subgenus 2. **Rygchium** Spinola

Insecta Ligur., I, 1806, p. 84 (as a genus).

Rhynchium H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 170.

Odynerus subgenus *Leionotus* H. de Saussure, Et. fam. Vesp., I, Eum., 1852, pp. 121 and 151.

Leptochilus H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 233.

Type: *Vespa oculata* Fabricius, 1781 (= *Rygchium europæum* Spinola, 1807).

12. **Odynerus abdominalis** (Illiger).

Vespa abdominalis Illiger, Magaz. f. Insektenk., I, 1802, p. 192.

Rhynchium abdominale H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 172; in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 159 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 42; Gen. Ins. Vesp., 1904, p. 33. C. T. Bingham, Fauna Brit. India, Hym., I, 1897, p. 357 (♀ ♂).

Vespa transversa Fabricius, Syst. Piez., 1804, p. 257.

Rygchium transversum H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 117; Pl. xiv, fig. 7 (♀).

Rhynchium transversum F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 48.

India, (Madagascar?).— Type locality: "aus Bengalen."

13. **Odynerus acanthoaspis** P. Cameron, Rec. Albany Mus., I, 4, 1905, p. 204 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 487.

Cape Colony.— Type locality: "Brak Kloof."

14. **Odynerus æquinoxialis** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 300 (♀).

Odynerus æquinoctialis Dalla Torre, Cat., IX, Vesp., 1894, p. 50; Gen. Ins. Vesp., 1904, p. 39. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 497.

Tropical Africa.— Type locality: "l'Afrique."

15. **Odynerus æstuans** (H. de Saussure).

Rhynchium æstuans H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 206 (♀). Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 285. Dalla Torre, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33. A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343; Deutsche entom. Zeitschr., 1914, p. 292.

Synagris æstuans var.? H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 155.

Senegal, Cameroon, Gaboon, Natal, Belgian Congo.— Type locality: "Sénégal."

16. **Odynerus æthiopicus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 287; Pl. xiii, fig. 8 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Dalla Torre, Cat., IX, Vesp., 1894, p. 50; Gen. Ins. Vesp., 1904, p. 39. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 488 and 496.

Sierra Leone.— Type locality: "Sierra Leone."

17. **Odynerus alboniger** J. Bequaert. See p. 172 (♀).

Belgian Congo.— Type locality: Thysville.

18. **Odynerus anceps** (Gribodo).

Rygchium anceps Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 280 (♀).

Rhynchium anceps Dalla Torre, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33. E. Roubaud, C. R. Ac. Sc. Paris, CLIII, 1911, pp. 476–480 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 16–30 (ethology).

West Africa: Upper Senegal, Dahomey, Niger, Benue, Belgian Congo.— Type locality: "Benue."

19. **Odynerus andreanus** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 167; Pl. xix, figs. 4, 4*b*, and 4*c* (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 52; Gen. Ins. Vesp., 1904, p. 40. R. du Buysson, Ann. Soc. ent. France, LXIX, 1900, p. 178, figs. 10 and 11 (♂).

Madagascar, Nossi Bé.— Type locality: "Nosibé."

20. **Odynerus angolensis** Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 204 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 52; Gen. Ins. Vesp., 1904, p. 40.

Angola, Belgian Congo.— Type locality: "Angola."

21. **Odynerus angustus** H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 228 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 52; Gen. Ins. Vesp., 1904, p. 40. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Abyssinia.— Type locality: "Abyssinie."

22. **Odynerus ardens** Guérin, in Lefebvre, Voy. Abyssinie, IV, Zool., pt. VI, 1848, p. 362; Atlas, Pl. viii, fig. 9.

Rygchium ardens H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 104 (♂).

Rhynchium ardens F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. Dalla Torre, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33.

Rygchium abyssinicum H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 103 (♀).

Rhynchium abyssinicum F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 208 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 175 (♀ ♂).

Abyssinia.— Type locality: "Abyssinie."

23. **Odynerus arethusæ** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 493 and 507 (♂).

Nyasaland.— Type locality: "Mlanje, 2300 ft."

24. **Odynerus armatiscutis** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 190 (♀). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 487 and 493. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 15.

East Africa.— Type locality: "Kilimandjaro, lower Kibonoto."

25. **Odynerus auratus** (Fabricius) W. A. Schulz, Berliner ent. Zeitschr., LVII, 1912, p. 82 (♀).

Vespa aurata Fabricius, Mant. Insect., I, 1787, p. 289. Olivier, Encycl. méthod. Insect., VI, 1791, p. 683. Dalla Torre, Cat., IX, Vesp., 1894, p. 138; Gen. Ins. Vesp., 1904, p. 66.

Sierra Leone.— Type locality: "in Sierra Leon Africæ."

26. **Odynerus aureosericeus** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 496 and 514 (♀).

Uganda.— Type locality: "W. of Victoria Nyanza, Buddu, 3700 ft."

27. **Odynerus auro-maculatus** (H. de Saussure).

Rygchium auro-maculatum H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 104; Pl. xiv, fig. 1 (♀ ♂).

Rhynchium auro-maculatum F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. Dalla Torre, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33.

Rhynchium aureo-maculatum E. Roubaud, Ann. Sc. nat., Zool., (10), I, 1, 1916, pp. 31–32 (ethology).

Rhynchium bioculatum H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 183 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. Dalla Torre, Cat., IX, Vesp., 1894, p. 43.

Senegal, Dahomey, Upper Niger.— This species was recorded from Java by H. de Saussure, probably by mistake.— Type locality: " Sénégal."

28. **Odynerus bairstowi** Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 292 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 55; Gen. Ins. Vesp., 1904, p. 40. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 498.

West Africa.— Type locality: "Benue."

29. **Odynerus bellatulus** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 210; Pl. xviii, fig. 10; III, Suppl., 1854, p. 243 (♀). Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. Dalla Torre, Cat., IX, Vesp., 1894, p. 55; Gen. Ins. Vesp., 1904, p. 41. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 497. E. Roubaud, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 35–36 (ethology).

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 14 (♂).

Odynerus bellatus F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Walker, List Hym. Egypt, 1871, p. 32.

Senegal, Egypt, Obock, Zanzibar Island, Angola.— Type locality: "le Sénégal."

30. **Odynerus bisellatus** A. v. Schulthess, Soc. entomol., XXIX, 1914, pp. 63 and 65 (♀ ♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 491; Pl. xci, fig. 2 (♂).

Delagoa Bay.— Type locality: " Rikatla."

31. **Odynerus bothriogaster** A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 27; Pl. i, fig. 6 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 57; Gen. Ins. Vesp., 1904, p. 41. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 496.

Belgian Congo.— Type locality: " Equateur-Congo."

Probably a color variety of *O. carinulatus* Saussure.

32. **Odynerus cameroni** W. A. Schulz, Spolia Hymenopterologica, 1906, p. 220. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 487 and 491.

Odynerus tegularis P. Cameron, Rec. Albany Mus., I, 4, 1905, p. 206 (♂). (*nec* Morawitz, 1885; *nec* P. Cameron, 1910).

Cape Colony.— Type locality: " Teafontein."

33. **Odynerus canaliculatus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 260; Pl. xiv, fig. 4 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. Dalla Torre, Cat., IX, Vesp., 1894, p. 58; Gen. Ins. Vesp., 1904, p. 41. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 486 and 491. A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 63.

Arabia.— Type locality: " l'Arabie."

34. **Odynerus capicola** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 495 and 512 (♀ ♂).

Cape Colony.— Type locality: " Willowmore."

35. **Odynerus carinulatus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 259; Pl. xiv, figs. 3 and 3*a* (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 618 (♂). Dalla Torre,

Cat., IX, Vesp., 1894, p. 59; Gen. Ins. Vesp., 1904, p. 42. C. T. Bingham, Ann. Mag. Nat. Hist., (7), X, 1902, p. 221. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 494.

Rhynchium stironotum P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 161 (♀ ♂).

Abyssinia, Belgian Congo, East Africa, Mozambique, Transvaal.— Type locality: " l'Afrique."

36. **Odynerus caviventris** Kirsch, Mitt. Zool. Mus. Dresden, III, 1878, p. 380 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 59; Gen. Ins. Vesp., 1904, p. 42. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33.

Lake Nyasa.— Type locality: " Nyassa."

37. **Odynerus chapini** J. Bequaert. See p. 188 (♀ ♂).

Belgian Congo.— Type locality: Stanleyville.

38. **Odynerus chloroticus** Spinola, Ann. Soc. ent. France, VII, 1838, p. 500 (♀); XI, 1842, Bull., p. xxxvii. H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 239. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. L. v. Heyden, Berliner ent. Zeitschr., XI, 1867, p. 398. Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 616 (♀ ♂). Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 687 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 60; Gen. Ins. Vesp., 1904, p. 42 C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110.

Rhynchium chloroticum F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 253, Pl. viii, fig. 8 (♂).

Savigny, Descr. Egypte, Atlas, Zool., Ins., Hym., 1812, Pl. ix, fig. 1 (♀).

Odynerus testaceus H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 195 (♀).

Egypt, Eastern Sudan, Southern Arabia.— Type locality: " Egypte."

39. **Odynerus chrysomallus** (A. Schletterer).

Rhynchium chrysomallum A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 23; Pl. i, fig. 9 (♀). F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. Dalla Torre, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33.

Gaboon, Belgian Congo.— Type locality: " Equateur-Congo."

40. **Odynerus cnemophilus** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 191 (♀). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 495. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 17.

East Africa.— Type locality: " Kilimandjaro, Kibonoto, 1300–1900 m."

41. **Odynerus combustus** F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 73 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 61; Gen. Ins. Vesp., 1904, p. 42. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 496.

Gambia.— Type locality: " the Gambia."

42. **Odynerus congolensis** J. Bequaert. See p. 176 (♀ ♂).

Belgian Congo.— Type locality: Boma.

43. **Odynerus conradsii** A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, pp. 17 and 20 (♀ ♂); Soc. entomol., XXIX, 1914, p. 63. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 491.

German East Africa.— Type locality: " Marienhof, Ukerewe."

44. **Odynerus corvus** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 498 and 517; Pl. xci, fig. 15 (♀ ♂).

British East Africa, Nyasaland, South East Rhodesia.— Type locality: " Mlanje."

45. **Odynerus cyanopterus** (H. de Saussure).

Rygchium cyanopterum H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 108 (♀ ♂).

Rhynchium cyanopterum F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 159 (♀ ♂). Walker, List Hym. Egypt, 1871, p. 31. Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 649 (♀ ♂). Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 613; (2), XIX, 1898, p. 594. Dalla Torre, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 109; Ann. Mag. Nat. Hist., (7), X, 1902, p. 221; (7), XII, 1903, p. 67. R. du Buysson, Bull. Soc. ent. France, 1908, p. 135.

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 9 (♂).

Senegal, Central Sahara, Egypt, Oriental Sudan, Abyssinia, Nyasaland, Southern Arabia, Madagascar.— Type locality: "Sénégal."

45*a*. var. **congicus** J. Bequaert. See p. 146 (♀).

Belgian Congo.— Type locality: Avakubi.

45*b*. var. **sabulosus** (H. de Saussure).

Rhynchium sabulosum H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 179. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. Dalla Torre, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Rhynchium cyanopterum var. *mossambicum* Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 98 (♀ ♂).

Rhynchium transvaalense P. Cameron, Ann. Transvaal Mus., II, 3, 1910, pp. 162 and 163 (♀).

Senegal, Mozambique, Transvaal.— Type locality: "Sénégal."

46. **Odynerus dantici** (Rossi) Spinola, Insecta Ligur., I, 1806, p. 88. H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 192 (♀ ♂); III, Suppl., 1854, p. 235 (♀ ♂). Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 700; Pl. xxxvi, figs. 13 and 19 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 63; Gen. Ins. Vesp., 1904, p. 43.

Vespa dantici Rossi, Fauna etrusca, II, 1790, p. 89; Pl. vi, fig. 6.

Odynerus fastidiosus H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 189 (♀). C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, pt. 1, 1898, p. 110.

Southern Europe, Northern Africa, Egypt, Asia Minor, Southern Arabia.— Type locality: Italy.

47. **Odynerus dauensis** Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 34 (♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 43. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Somaliland.— Type locality: "lungo il Daua."

48. **Odynerus defractus** R. du Buysson, Rev. d'Ent. Caen, XXV, 1906, p. 108 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 493.

Odynerus parvulus var. H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 225 (♂).

Odynerus parvulus P. Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 617. Walker, List Hym. Egypt, 1871, p. 32 (*nec* Lepeletier, 1841).

East Africa, Abyssinia, Eastern Sudan.— Type locality: "Nairobi."

The true *O. parvulus* Lepeletier, Hist. nat. Ins. Hym., II, 1841, p. 631, is a Mediterranean species, which apparently does not occur in the Ethiopian region.

49. **Odynerus denticulatus** (A. Mocsáry).

Synagris denticulata A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 506 (♀).

Rhynchium denticulatum F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 310.

German East Africa.— Type locality: "Ukami."

50. **Odynerus desperatus** J. Bequaert. See p. 166 (♀ ♂).

Belgian Congo.— Type locality: Stanleyville.

51. **Odynerus determinatus** P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 163 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Transvaal.— Type locality: "Waterval."

52. **Odynerus dimidiatus** Spinola, Ann. Soc. ent. France, VII, 1838, p. 502 (♀ ♂). H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 260. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. Ed André, Spéc. Hym. Eur. Algér., II, fasc. 24–26, 1886, p. 867 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 65; Gen. Ins. Vesp., 1904, p. 44. W. A. Schulz, Spolia Hymenopterologica, 1906, p. 219.

Rhynchium dimidiatum H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 182. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33.

Egypt, Malta Island.— Type locality: "Egypte."

53. **Odynerus dimorphus** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 492 and 507 (♀ ♂).

Orange Free State, German Southwest Africa.— Type locality: "Bothaville."

54. **Odynerus dunbrodyensis** P. Cameron, Rec. Albany Mus., I, 4, 1905, p. 264 (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 487.

Odynerus carinatus G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 491 and 502; Pl. xci, fig. 7 (♀ ♂).

Cape Colony.— Type locality: "Dunbrody."

55. **Odynerus emeryanus** Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 293 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 66; Gen. Ins. Vesp., 1904, p. 44. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Odynerus benitensis A. v. Schulthess, Soc. entomol., XXVIII, 1913, p. 6 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 348, figs. 10–12 (♀ ♂).

Sierra Leone, Spanish Guinea, Belgian Congo.— Type locality: "Sierra Leone."

56. **Odynerus erythrinus** (H. de Saussure).

Rhynchium erythrinum H. de Saussure, Reise d. Novara, Zool., II, 1, Hymen., 1867, p. 7 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33.

Cape Colony.— Type locality: "Promontorium Bonæ Spei."

57. **Odynerus erythrotomus** P. Cameron, Rec. Albany Mus., I, 5, 1905, p. 325 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 488 and 497.

Cape Colony.— Type locality: "Dunbrody."

58. **Odynerus euryspilus** P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 166 (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 494 and 510 (♀ ♂).

Odynerus broomi P. Cameron MS. (*teste* G. Meade Waldo).

Transvaal, Cape Colony.— Type locality: "Transvaal."

59. **Odynerus exiguus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 321 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 67; Gen. Ins. Vesp., 1904, p. 45.

Leptochilus exiguus H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 237 (♀ ♂).

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hymén., 1812, Pl. viii, fig. 11 (♀ ♂).

Egypt.— Type locality: ?

60. **Odynerus falcatus** A. Tullgren, Ark. f. Zool., I, 1904, p. 452; Pl. xxv, figs. 13 *a–b* (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 488 and 497.

Odynerus 14-maculatus A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp. (1907–08), IV, Zool., 2, Heft 10, 1912, p. 294, figs. 4–6 (♀ ♂); Soc. entomol., XXVIII, 1913, p. 6 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 347, figs. 7–9 (♀ ♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 497.

Belgian Congo, Cameroon.— Type locality: " Cameroon."

61. **Odynerus fallax** (H. de Saussure).

Rhynchium fallax H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 175 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33. C. T. Bingham, Ann. Mag. Nat. Hist., (7), X, 1902, p. 221. P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 162.

West Africa, Angola, Nyasaland, Transvaal.— Type locality: " Afrique occidentale."

62. **Odynerus farquharensis** P. Cameron, Trans. Linn. Soc. London, (2), XII, Zool., pt. 1, 1907, p. 74 (♀ ♂). G. Meade Waldo, Trans. Linn. Soc. London, (2), XV, Zool., pt. 1, 1912, p. 43.

Farquhar Island, Aldabra Island.— Type locality: " Farquhar Atoll."

63. **Odynerus fastidiosissimus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 265; Pl. xii, fig. 7 (♀ ♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 224 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 68. Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 740 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 67; Gen. Ins. Vesp., 1904, p. 45.

Southern Europe, North Africa, Egypt.— Type locality: unknown.

64. **Odynerus ferruginatus** J. Bequaert.

Stenodynerus ferrugineus A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 72, fig. (♀ ♂).

Odynerus ferrugineus G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 498; Pl. xci, fig. 13.

Delagoa Bay, North Transvaal, East Africa.— Type locality: " Rikatla."

65. **Odynerus ferrugineus** (Radoszkowsky).

Rhynchium ferrugineum Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33.

Angola.— Type locality: " Angola."

66. **Odynerus fervens** (Walker).

Rhynchium fervens Walker, List Hym. Egypt, 1871, p. 31 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33.

Arabia.— Type locality: " Mount Sinai."

67. **Odynerus fervidus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 288. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. Dalla Torre, Cat., IX, Vesp., 1894, p. 68; Gen. Ins. Vesp., 1904, p. 45. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 487 and 494; Pl. xci, fig. 10 (♂).

Africa, Southern Arabia.— Type locality: "l'Afrique."

68. **Odynerus foraminosus** (Gribodo).

Rhynchium foraminosum Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 101 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 34.

Mozambique.— Type locality: "Lourenço-Marques."

69. **Odynerus forticulus** (F. Kohl).

Rhynchium forticulum F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250; Pl. v, figs. 15, 23, 28, and 30 (♀ ♂).

Southern Arabia, Egypt.— Type locality: "Südarabien (Makalla)."

70. **Odynerus frendens** Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 294 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 69; Gen. Ins. Vesp., 1904, p. 45. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Cape Colony.— Type locality: "Port Elizabeth."

71. **Odynerus gambiensis** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 492 and 504 (♀).

Gambia.— Type locality: "Gambia."

72. **Odynerus goniodes** A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 25; Pl. i, fig. 4 (♀ ♂). F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 493; Pl. xci, fig. 5.

Odynerus gonioides Dalla Torre, Cat., IX, Vesp., 1894, p. 70; Gen. Ins. Vesp., 1904, p. 46.

Belgian Congo, Cameroon.— Type locality: "Equateur-Congo."

73. **Odynerus grandidieri** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 164; Pl. iv, fig. 16 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 237 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 71; Gen. Ins. Vesp., 1904, p. 46.

Madagascar.— Type locality: "Madagascar."

74. **Odynerus grayi** (H. de Saussure).

Rhynchium grayi H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 175 (♀). Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 285. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47; Pl. iii, fig. 1. Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 34.

Cape Colony, Natal, East Africa.— Type locality: "Port Natal."

74*a*. var. **neavei** (G. Meade Waldo).

Rhynchium grayi var. *neavei* G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 456 (♂).

Nyasaland.— Type locality: "Karonga."

74*b*. var. **sumptuosus** (Gribodo).

Rhynchium grayi var. *sumptuosum* Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 95 (♀).

Mozambique.— Type locality: "Lourenzo Marques."

74*c*. var. **thomsoni** (P. Cameron).

Rhynchium thomsoni P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 183 (♀) [See G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51].

East Africa.— Type locality: " Kilimandjaro: Kibonoto."

74*d*. var. **usambaraensis** (P. Cameron).

Rhynchium usambaraense P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 183 (♀ ♂). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Rhynchium grayi var. *usambaraense* A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 57.

East Africa.— Type locality: " Usambara: Mombo."

75. **Odynerus guerinii** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 176 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. Dalla Torre, Cat., IX, Vesp., 1894, p. 71; Gen. Ins. Vesp., 1904, p. 46. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488. Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 102.

Odynerus æstuans H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 222; Pl. ii, fig. 25 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 50; Gen. Ins. Vesp., 1904, p. 39.

Abyssinia, Mozambique.— Type locality: " l'Afrique."

76. **Odynerus guineensis** H. de Saussure, Rev. Mag. de Zool., (2), X, 1858, p. 167. Dalla Torre, Cat., IX, Vesp., 1894, p. 71; Gen. Ins. Vesp., 1904, p. 46.

Guinea.— Type locality: " l'Afrique tropicale."

77. **Odynerus guineensis** H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 227 (♀). (*nec O. guineensis* Saussure, 1858).

Guinea.— Type locality: " Côte de Guinée."

This wasp is entirely different from the *Odynerus guineensis* described by H. de Saussure in 1858, as can be seen easily in comparing the descriptions. This species has probably been redescribed under some other name, so it does not seem advisable to rename it here.

78. **Odynerus hæmorrhoidalis** (Fabricius).

Vespa hæmorrhoidalis Fabricius, Syst. Entom., 1775, p. 366. Olivier, Encycl. méthod. Ins., VI, 1791, p. 683.

Rygchium hæmorrhoidale H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 109 (♀ ♂).

Rhynchium hæmorrhoidale Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 34.

This variable wasp is common throughout the Oriental Region, from Persia to New Guinea, Australia, and Formosa. Originally described by Fabricius from the Cape Colony, where its occurrence is very doubtful.— Type locality: " ad Cap. b. Spei."

78*a*. var. **quinquecinctus** (Fabricius).

Vespa quinquecincta Fabricius, Mant. Insect., I, 1787, p. 288. Olivier, Encycl. méthod. Ins., VI, 1791, p. 683.

Vespa brunnea Fabricius, Ent. Syst., II, 1793, p. 264.

Rygchium brunneum H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 112; Pl. xiv, figs. 4 and 4*a–d* (♀ ♂).

Rhynchium brunneum F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 44. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Fauna of Brit. India, Hym., I, 1897, p. 355, fig. 103 (♀ ♂).

Rhynchium hæmorrhoidale var. *brunneum* H. de Saussure, Entom. Zeitg. Stettin, XXIII, 1862, p. 190.

Rhynchium hæmorrhoidale var. *quinquecinctum* Dalla Torre, Cat., IX, Vesp., 1894, p. 45; Gen. Ins. Vesp., 1904, p. 34.

Throughout the Oriental Region and apparently the most common color variation of the species; extends westward to Southern Arabia (Aden).— Type locality: " China."

79. **Odynerus hansi** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 491 and 503 (♂).

Orange Free State.— Type locality: " Bothaville."

80. **Odynerus harrarensis** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 497 and 516 (♀ ♂).

Abyssinia, East Africa.— Type locality: " Harrar."

81. **Odynerus hildebrandti** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 166; Pl. xvii, fig. 10 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 237. Dalla Torre, Cat., IX, Vesp., 1894, p. 72; Gen. Ins. Vesp., 1904, p. 46.

Madagascar.— Type locality: " partie centrale de Madagascar."

82. **Odynerus histrionicus** (Gerstæcker).

Rhynchium histrionicum Gerstæcker, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 465; Pl. xxx, fig. 4 (♀). Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. Dalla Torre, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 274.

Rhynchium emeryanum Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 99 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 33.

Mozambique, Angola.— Type locality: " Mossambique."

83. **Odynerus histrionimimus** J. Bequaert. See p. 190 (♀ ♂).

Belgian Congo.— Type locality: Banana.

84. **Odynerus holomelas** (Ern. André).

Rhynchium holomelas Ern. André, Rev. d' Ent. Caen, XIV, 1895, p. 355 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 34. A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 344; Deutsche entom. Zeitschr., 1914, p. 292.

Cameroon, Gaboon.— Type locality: " Ogooué."

85. **Odynerus holosericeus** (Radoszkowsky).

Rhynchium holosericeum Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 206 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34.

Angola.— Type locality: " Angola."

Probably a synonym of *O. cyanopterus* (Saussure).

86. **Odynerus hottentotus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 244 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 71. Dalla Torre, Cat., IX, Vesp., 1894, p. 72; Gen. Ins. Vesp., 1904, p. 47. R. du Buysson, Ann. Soc. ent. France, LXVI, fasc. 2–3, 1898, p. 361. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 68. G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VI, 1910, p. 101; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 495 and 511; Pl. xci, fig. 8.

Odynerus posticus H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 214 (♂). (*nec* Herrich Schæffer, 1841).

Odynerus erythrospilus P. Cameron, Rec. Albany Mus., I, 4, 1905, p. 205 (♀).

Cape Colony, Transvaal, Mashonaland.— Type locality: "le Cap de Bonne-Espérance."

87. **Odynerus hova** H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a.M., XXVI, 2, 1900, p. 238 (♀ ♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 47.

Nossi Bé.— Type locality: "Nossi-Bé."

88. **Odynerus hyacintæ** Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 290 (♂ ♀).

Odynerus hyacinthæ Gribodo, *op. cit.*, p. 291. Dalla Torre, Cat., IX, Vesp., 1894, p. 73; Gen. Ins. Vesp., 1904, p. 47. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Sierra Leone, Gaboon, Belgian Congo.— Type locality: "Gaboon."

89. **Odynerus ignaruris** F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 256; Pl. II, fig. 18; Pl. VIII, figs. 1, 11, 17, and 21 (♀).

Southern Arabia.— Type locality: "Ras Fartàk."

90. **Odynerus incensus** (Gribodo).

Rhynchium incensum Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 95 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 34.

Mozambique.— Type locality: "Pinetown."

91. **Odynerus indecorus** P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 166 (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 488 and 497.

Cape Colony.— Type locality: "Dunbrody."

92. **Odynerus inermis** (A. Mocsáry).

Synagris inermis A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 504 (♀ ♂).

Rhynchium inerme F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 316.

German East Africa.— Type locality: "Ukami."

92*a*. var. **atratus** (A. Mocsáry).

Synagris inermis var. *atrata* A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 505 (♀).

Rhynchium inerme var. *atratum* F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 316.

East Africa.— Type locality: "Kilimandsaro."

93. **Odynerus jocosus** A. Gerstæcker, Arch. f. Naturg., XXXVIII, 1, 1871, p. 351 (♂); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 323 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 493.

British East Africa.— Type locality: "Mombas."

94. **Odynerus junodi** (Gribodo).

Rhynchium junodi Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. Nat., p. 97 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 34.

Mozambique.— Type locality: "Lourenço-Marques."

Apparently the same as *O. lacuum* (Stadelmann).

95. **Odynerus junodianus** (A. v. Schulthess).

Rhynchium junodianum A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 273 (♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 34.

Mozambique.— Type locality: "Delagoa."

96. **Odynerus kabarensis** J. Bequaert. See p. 186 (♀ ♂).

Belgian Congo.— Type locality: Kabare.

97. **Odynerus karibæ** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 493 and 508 (♀ ♂).

North Rhodesia, Nyasaland, Southeastern Belgian Congo (Katanga).— Type locality: " N. Rhodesia: Kariba Gorge."

98. **Odynerus katonai** A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, pp. 17 and 18 (♀); Soc. entom., XXIX, 1914, p. 62. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 491.

British and German East Africa.— Type locality: " Shirati."

99. **Odynerus kelidopterus** (F. Kohl).

Rhynchium kelidopterum F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 252; Pl. ii, fig. 19; Pl. viii, figs. 3, 9, 10, and 22 (♂).

Southern Arabia.— Type locality: " Aden."

100. **Odynerus kilimandjaroensis** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 189 (♀). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 495. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

East Africa.— Type locality: " Meru low lands, Ngare na nyuki."

101. **Odynerus kloofensis** P. Cameron, Rec. Albany Mus., I, 4, 1905, p. 204 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Cape Colony.— Type locality: " Brak Kloof."

102. **Odynerus kristenseni** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 491 and 504 (♀).

Abyssinia.— Type locality: " Harrar."

103. **Odynerus lacuum** (Stadelmann).

Rhynchium lacuum Stadelmann, Deutsch Ost-Afrika, IV, Hym., 1898, p. 33 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 34.

Tanganyika (German East Africa).— Type locality: "Tanganyika-See."

Probably a synonym of *O. junodi* (Gribodo).

104. **Odynerus lateralis** (Fabricius), G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 495, 510, and 512 (♀ ♂).

Vespa lateralis Fabricius, Spec. Insect., I, 1781, p. 466 (♀); Mantis. Ins., I, 1787, p. 292.

Rhynchium furax F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 339; Pl. xv, fig. 89 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 34.

Odynerus truncatus H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 175 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 103; Gen. Ins. Vesp., 1904, p. 56.

Senegal, Gaboon, Belgian Congo, German East Africa (Bukoba).— Type locality: " ad Cap. B. S."

104*a*. var. **lateropictus** J. Bequaert. See p. 181 (♀ ♂).

Belgian Congo.— Type locality: Boma.

104*b*. var. **unicolor** (A. v. Schulthess) G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 495.

Odynerus truncatus var. *unicolor* A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 57.

Lake Nyasa, Usumbara, Damaraland, Portuguese East Africa.— Type locality: " Ukerewe am Nyassasee."

105. **Odynerus luctuosus** (Gerstæcker).

Rhynchium luctuosum Gerstæcker, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♀ ♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 467, Pl. xxx, fig. 6 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34. F. Kohl, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 189. Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 33. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 274. E. Zavattari, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 550, 1907, p. 2.

Mozambique, Somaliland.— Type locality: "Tette."

106. **Odynerus lugubris** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 495 and 513 (♀ ♂).

Nyasaland.— Type locality: "Mlanje, 2300 ft."

107. **Odynerus macrocephalus** Gribodo, Mem. Ac. Sc. Bologna, (5), IV, 1894, Sc. natur., p. 60 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 48. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 488 and 497.

Mozambique.— Type locality: "fiume Magnarra."

108. **Odynerus madecassis** (H. de Saussure).

Rygchium madecasse H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 111 (♀).

Rhynchium madecassum H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 160; Pl. iv, figs. 11 and 11*t* (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34. A. v. Schulthess, Reise Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 72.

Rhynchium madegasse F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 48.

Madagascar, Nossi Bé.— Type locality: "Madagascar."

109. **Odynerus magrettii** Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 290, in footnote (♀ ♂). Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 619. Dalla Torre, Cat., IX, Vesp., 1894, p. 77; Gen. Ins. Vesp., 1904, p. 48. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489. W. A. Schulz, Zool. Ann. Würzburg, IV, 1911, p. 199.

Abyssinia.— Type locality: "Abissinia."

110. **Odynerus malagassus** H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 237 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 48.

Nossi Bé.— Type locality: "Nossi-Bé."

111. **Odynerus marginellus** (Fabricius).

Vespa marginella Fabricius, Ent. System., II, 1793, p. 263; Syst. Piez., 1804, p. 259.

Rhynchium marginellum R. du Buysson, Actes Soc. Linn. Bordeaux, LXIV, 1910, p. 228. E. Roubaud, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 32–35 (ethology).

Vespa africana Fabricius, Syst. Piez., 1804, p. 257.

Rygchium africanum Guérin, in Lefebvre, Voy. Abyssinie, IV, Zool., pt. VI, 1848, p. 363. H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 108; Pl. xiv, figs. 3 and 3*a* (♀).

Rhynchium africanum A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 24; Pl. i, fig. 7 (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 513.

Rhynchium laterale H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 171. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 344. Dalla Torre, Cat., IX, Vesp., 1894, p. 46; Gen.

Ins. Vesp., 1904, p. 34. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 68. A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 344. Walker, List Hym. Egypt, 1871, p. 31. A. Tullgren, Ark. f. Zool., I, 1904, p. 451. P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 163.

Rygchium laterale Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 291. Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 614 (♂).

Mauritania, Senegal, Cameroon, Gaboon, Belgian Congo, Somaliland, Transvaal. — Type locality: " in Africa æquinoctiali."

112. **Odynerus marginipunctatus** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 496 and 513; Pl. xci, fig. 6 (♀).

Nyasaland.— Type locality: " Mlanje, 2300 ft."

113. **Odynerus marginiscutis** (P. Cameron).

Rhynchium marginiscutis P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 162 (♀).

Transvaal.— Type locality: " Warmberg."

114. **Odynerus meade-waldoi** J. Bequaert.

Odynerus deceptor G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 495 and 511 (♀). (*nec O. deceptor* E. Saunders, Trans. Ent. Soc. London, 1905, p. 407).

Portuguese East Africa, Nyasaland, North East Rhodesia, Transvaal.— Type locality: " Kola Valley, 1700 ft."

115. **Odynerus melanchrous** F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw., Kl., LXXI, 1, 1907, p. 254; Pl. v, figs. 5, 10, 14, 16, and 19 (♀ ♂).

? *Icaria aterrima* W. F. Kirby, Bull. Liverpool Mus., III, 1900, p. 23 (♀); Nat. Hist. of Sokotra by H. O. Forbes, Zool. Hym., 1903, p. 256; Pl. xvi, fig. 8 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 73.

Abd el Kuri Island (Sokotra).— Type locality: " Insel Abd el kuri."

116. **Odynerus melanodontus** P. Cameron, Records Albany Mus., I, 4, 1905, p. 263 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 487.

Cape Colony.— Type locality: " Dunbrody."

117. **Odynerus melanus** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 159; Pl. xviii, fig. 9 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 172 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 66. Dalla Torre, Cat., IX, Vesp., 1894, p. 78; Gen. Ins. Vesp., 1904, p. 49.

Madagascar.— Type locality: " Madagascar."

118. **Odynerus mephisto** (Gribodo).

Rygchium mephisto Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 283 (♀).

Rhynchium mephisto Dalla Torre, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34.

Sierra Leone.— Type locality: " Sierra Leone."

119. **Odynerus meridionalis** H. de Saussure, Entom. Zeitg. Stettin, XXIII, 1862, p. 205 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 78; Gen. Ins. Vesp., 1904, p. 49. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Cape Colony.— Type locality: " le Cap de Bonne-Espérance."

120. **Odynerus metatarsalis** A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, pp. 17 and 21, fig. 10*a* (♂); Soc. entom., XXIX, 1914, p. 63. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 491.

German East Africa.— Type locality: " Shirati."

121. **Odynerus metemmensis** Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 617 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 78; Gen. Ins. Vesp., 1904, p. 49. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 493.

Nubia, Somaliland.— Type locality: " Metemma."

122. **Odynerus meyeri** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 184 (♀ ♂). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 494. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 17.

Rhynchium meyeri P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 163.

East Africa.— Type locality: " Meru low lands, Ngare na nyuki."

122*a*. var. **albolimbatus** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 57 (♀ ♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 494.

Belgian Congo, Lake Nyasa, Rhodesia, Bechuanaland, Damaraland, Lourenzo Marques.— Type locality: " Nyassasee, Langenburg."

123. **Odynerus mucronatus** H. de Saussure, Entom. Zeitg. Stettin, XXIII, 1862, p. 203 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 80; Gen. Ins. Vesp., 1904, p. 49. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

Guinea.— Type locality: " la Côte de Guinée."

124. **Odynerus multicolor** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 209; Pl. xviii, figs. 11 and 11*a* (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Dalla Torre, Cat., IX, Vesp., 1894, p. 80; Gen. Ins. Vesp., 1904, p. 49. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 488 and 497.

Senegal.— Type locality: " le Sénégal."

125. **Odynerus multispinosus** (H. de Saussure).

Rhynchium multispinosum H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 177 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. Dalla Torre, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 34.

Natal.— Type locality: " Port Natal."

126. **Odynerus mutabilis** H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 231; Pl. ii, fig. 26 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 81; Gen. Ins. Vesp., 1904, p. 50. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 497.

Abyssinia.— Type locality: " Abyssinie."

127. **Odynerus mutans** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 288; Pl. xiii, fig. 7 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 81; Gen. Ins. Vesp., 1904, p. 50. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 488 and 497.

Senegal.— Type locality: " la Sénégambie."

128. **Odynerus natalensis** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 261 (♂); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 175 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Dalla Torre, Cat., IX, Vesp., 1894, p. 81; Gen. Ins. Vesp., 1904, p. 50. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Cape Colony, Natal, (not Madagascar as given by Dalla Torre).— Type locality: " les terres du Cap de Bonne-Espérance."

129. **Odynerus niloticus** (H. de Saussure).

Rhynchium niloticum H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 181; Pl. xvi, fig. 8 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. Dalla Torre, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 34. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250 (♀ ♂).

Egypt, Abyssinia, Southern Arabia, Sokotra.— Type locality: " Abyssinie."

130. **Odynerus nyassæ** (Kirsch).

Rhynchium nyassæ Kirsch, Mitth. Zool. Mus. Dresden, III, 1878, p. 378 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 34. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 32. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 273.

Nyasa, Delagoa Bay.— Type locality: " Nyassa."

131. **Odynerus oculatus** (Fabricius).

Vespa oculata Fabricius, Spec. Insect., I, 1781, p. 463. Olivier, Encycl. méthod. Ins., VI, 1791, p. 685.

Rygchium oculatum Lepeletier, Encycl. méthod. Ins., X, 1825, p. 317; Hist. nat. Ins. Hym., II, 1841, p. 680 (♀ ♂). H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 107 (♀ ♂).

Rhynchium oculatum H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 171. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 43. Lichtenstein, Ann. Soc. ent. France, (4), IX, 1869, Bull., p. lxxiii. Walker, List Hym. Egypt, 1871, p. 30. Lucas, Ann. Soc. ent. France, (5), IX, 1879, Bull., p. cxlvi. Ed. André, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 647; Pl. xlii, figs. 3–6 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 34. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, Pl. i, fig. 1.

Rygchium europæum Spinola, Insecta Ligur., I, 1806, p. 86 (♀ ♂).

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 10 (♂).

Southern Europe, Egypt, Southern Arabia.— Type locality: " Italia."

131*a*. var. **somalicus** (Magretti).

Rygchium oculatum var. *somalicum* Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 594 (♂).

Rhynchium oculatum var. *somalicum* Dalla Torre, Gen. Ins. Vesp., 1904, p. 34.

Abyssinia.— Type locality: " laggo Bass Narok."

132. **Odynerus o'neili** P. Cameron, Rec. Albany Mus., I, 5, 1905, p. 326 (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Cape Colony.— Type locality: " Dunbrody."

133. **Odynerus oogaster** (Gribodo).

Rhynchium oogaster Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 101 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 35.

Mozambique.— Type locality: " Lourenzo Marques."

134. **Odynerus osborni** J. Bequaert. See p. 141 (♀).

Belgian Congo.— Type locality: Walikale.

135. **Odynerus pakasæ** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 492 and 506 (♀ ♂).

North Rhodesia, Portuguese East Africa, German South West Africa.— Type locality: " N. Rhodesia: Pakasa."

136. **Odynerus penetratus** P. Cameron, Ann. Transvaal Mus., II, 3, 1910,

p. 164 (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Transvaal.— Type locality: " Rietfontein."

137. **Odynerus perfidiosus** (P. Cameron).

Rhynchium perfidiosum P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 161 (♀ ♂).

Transvaal.— Type locality: " Waterkloof."

138. **Odynerus picturatus** J. Bequaert. See p. 137 (♂).

Belgian Congo.— Type locality: Thysville.

139. **Odynerus politiclypeus** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 73, fig. (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 498 and 516; Pl. xci, fig. 14 (♀).

Nyasaland, Katanga, Bechuanaland.— Type locality: " Bunkeya."

140. **Odynerus pseudolateralis** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 494 and 509 (♀ ♂).

Northern Nigeria, Gambia, Belgian Congo.— Type locality: " N. Nigeria: Minna."

141. **Odynerus pulchellus** (A. Gerstæcker) G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 494 and 509.

Rhynchium pulchellum A. Gerstæcker, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 466; Pl. xxx, fig. 5 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 35.

Mozambique, Nyasaland, North Rhodesia, German and British East Africa.— Type locality: " Inhambane."

142. **Odynerus pulchripiloselloides** A. v. Schulthess, Soc. entom., XXIX, 1914, pp. 63 and 72 (♀).

Delagoa Bay.— Type locality: " Rikatla."

143. **Odynerus pulchripilosellus** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 186 (♀). A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 16 (♀ ♂); Soc. entomol., XXIX, 1914, pp. 63 and 72 (♀ ♂). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 491 and 503.

East Africa, Nyasaland, Eritrea, North East Rhodesia, Transvaal, Delagoa Bay, Natal.— Type locality: " Kilimandjaro: Kibonoto, 1000–1300 m."

144. **Odynerus punctatipennis** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 210 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 91; Gen. Ins. Vesp., 1904, p. 52. C. T. Bingham, Ann. Mag. Nat. Hist., (7), X, 1902, p. 221.

India, Nyasaland, Natal.— Type locality: " les Indes orientales? "

145. **Odynerus quadri-tuberculatus** F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 92; Gen. Ins. Vesp., 1904, p. 52. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 491 and 503; Pl. xci, fig. 3. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 17; Soc. entomol., XXIX, 1914, pp. 63 and 72 (♀ ♂).

Natal, North Transvaal.— Type locality: " Port-Natal."

146. **Odynerus radialis** (H. de Saussure).

Rhynchium radiale H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 179. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 207. Dalla Torre, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 35.

Natal, Angola.— Type locality: " Port-Natal."

147. **Odynerus rhizophorarum** J. BEQUAERT. See p. 192 (♂).

Belgian Congo.— Type locality: Malela.

148. **Odynerus rhynchoides** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 174; Pl. XVII, fig. 12 (♂); III, Suppl., 1854, p. 231. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 619. DALLA TORRE, Cat., IX, Vesp., 1894, p. 93; Gen. Ins. Vesp., 1904, p. 53. R. DU BUYSSON, Actes Soc. Linn. Bordeaux, LXIV, 1910, p. 228. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 494 and 509.

Odynerus interruptus H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 221 (♀) (*nec* BRULLÉ, 1832).

Odynerus saussurei ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 682 (♀). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 620. DALLA TORRE, Cat., IX, Vesp., 1894, p. 95; Gen. Ins. Vesp., 1904, p. 54.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. IX, fig. 17 (♀).

Gambia, Senegal, Mauritania, Algerian Sahara (Biskra), White Nile, Straits of Bab el Mandeb (Tajura), Egypt, Abyssinia.— Type locality: " le Sénégal."

149. **Odynerus rikatlensis** A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, pp. 63 and 72 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 491.

Delagoa Bay.— Type locality: " Rikatla."

150. **Odynerus rotundiscutis** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 185 (♀ ♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 497. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

Odynerus meruensis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 186 (♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 488 and 497. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

East Africa.— Type locality: " Meru low lands, Ngara na nyuki."

151. **Odynerus rubellulus** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 255; Pl. V, figs. 8, 12, 13, and 17 (♀ ♂).

Semha Island.— Type locality: " Insel Sémha."

152. **Odynerus rubens** (H. DE SAUSSURE).

Rhynchium rubens H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 181 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, 1857, p. 46. GERSTÆCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 466 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 273.

Cape Colony, Delagoa Bay.— Type locality: " Cap de Bonne-Espérance."

153. **Odynerus rubroniger** C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 222 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 53. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 491.

Transvaal.— Type locality: " Pretoria."

154. **Odynerus rufiventris** (RADOSZKOWSKY).

Rhynchium rufiventre RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 206 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Angola.— Type locality: " Angola."

Probably a synonym of *O. rubens* (Saussure).

155. **Odynerus rufoniger** J. Bequaert. See p. 164 (♀).

Belgian Congo.— Type locality: Stanleyville.

156. **Odynerus sakalavus** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 169; Pl. xxii, fig. 4 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 95; Gen. Ins. Vesp., 1904, p. 53.

Nossi Bé.— Type locality: " Nosibé."

157. **Odynerus schönlandi** P. Cameron, Rec. Albany Mus., I, 4, 1905, pp. 203 and 264 (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 487.

Cape Colony.— Type locality: " Brak Kloof."

158. **Odynerus schubotzianus** (A. v. Schulthess).

Rhynchium schubotzianum A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lf. 10, 1912, p. 293, figs. 1–3 (♀ ♂); Soc. entomol., XXVIII, 1913, p. 2; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 345, figs. 2–4; Deutsche entom. Zeitschr., 1914, p. 292.

Belgian Congo (Ituri), Lake Nyasa.— Type locality: "Nyassa-See, Langenburg."

159. **Odynerus schulthessi** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 497 and 514; Pl. xci, fig. 11 (♀).

British East Africa.— Type locality: " Kuja Valley, S. Kavirondo."

160. **Odynerus schultzeanus** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 57 (♀ ♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 495.

Damaraland.— Type locality: " Lüderitzbucht."

161. **Odynerus scripticeps** P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 167 (♀). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 496; Pl. xci, fig. 9.

Transvaal.— Type locality: " Kranspoort."

162. **Odynerus senex** P. Cameron, Rec. Albany Mus., I, 5, 1905, p. 324 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 486 and 492.

Cape Colony.— Type locality: " Dunbrody."

163. **Odynerus sesquicinctus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 299 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 487.

Cape Colony.— Type locality: " le Cap de Bonne-Espérance."

164. **Odynerus seychellensis** Dalla Torre, Gen. Ins. Vesp., 1904, p. 54. G. Meade Waldo, Trans. Linn. Soc. London, (2), XV, Zool., pt. 1, 1912, p. 43.

Odynerus cylindricus J. Pérez, Ann. Soc. ent. France, LXIV, 1895, p. 207 (♀). P. Cameron, Trans. Linn. Soc. London, (2), XII, Zool., pt. 1, 1907, p. 72 (♂). (*nec O. cylindricus* Saussure, 1862).

Odynerus neonymus W. A. Schulz, Spolia Hymenopterologica, 1906, p. 218.

Seychelles Islands, Amirantes Islands.— Type locality: " Mahé."

165. **Odynerus sheffieldi** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 497 and 515 (♀ ♂).

Northern Nigeria, North East Rhodesia, Nyasaland, Portuguese East Africa, Belgian Congo.— Type locality: " Mlanje."

165*a*. var. **marginifasciatus** J. Bequaert. See p. 176 (♀).

Belgian Congo.— Type locality: Faradje.

166. **Odynerus signatus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 258 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. Dalla Torre, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 493.

South Africa.— Type locality: "l'Afrique méridionale."

167. **Odynerus signiferus** (P. Cameron).

Rhynchium signiferum P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 160 (♂).

Transvaal.— Type locality: "Waterval."

168. **Odynerus silaos** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 213; Pl. xix, fig. 6 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54. A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 63.

Odynerus silaensis H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 244; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 233; in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 172 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 239. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 71. A. v. Schulthess, Reise Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 72; Ark. f. Zool., VIII, No. 17, 1913, pp. 15 and 16. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 492. P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 190.

Abyssinia, German East Africa (Pemba Island), Cape Colony, Réunion, Madagascar, Nossi Bé.— Type locality: "l'île Bourbon."

168*a*. var. **asmarensis** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 63 (♀ ♂).

Odynerus asmarensis G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 493 and 507 (♀ ♂).

Eritrea.— Type locality: "Asmara."

168*b*. var. **ukerewensis** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 63 (♀).

Odynerus ukerewensis G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 493 (♀).

German East Africa.— Type locality: "Ukerewe."

169. **Odynerus silverlocki** G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 492 and 505; Pl. xci, figs. 4*a* and 4*b* (♀).

Northern Rhodesia.— Type locality: "85 miles west of Kariba Gorge."

170. **Odynerus simonyi** (F. Kohl).

Rhynchium simonyi F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 251; Pl. viii, figs. 6, 7, and 18 (♂).

Southern Arabia.— Type locality: "Rhas Farták."

171. **Odynerus simplidentatus** G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VI, 910, p. 107 (♂); Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 496.

Mashonaland.— Type locality: "Salisbury."

172. **Odynerus sirdari** (F. D. Morice).

Rhynchium sirdari F. D. Morice, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 612 (♂); Res. Swed. Zool. Exp. Jägerskiöld, pt. I, 1904, Hym. ac., p. 4.

Egyptian Sudan.— Type locality: "Khartum."

173. **Odynerus sjöstedti** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 188 (♀). G. Meade Waldo, Ann. Mag. Nat. Hist.

(8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 492 and 507. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 15, fig. 10*b* (♀ ♂).

East Africa, Nyasaland.— Type locality: "Usambara: Mombo."

174. **Odynerus socotræ** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 257; Pl. v, figs. 1 and 4 (♀ ♂).

Sokotra Island.— Type locality: "Ras Shoab."

175. **Odynerus solstitialis** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 298 (♂). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 620 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 97; Gen. Ins. Vesp., 1904, p. 54. GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 103 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 494.

Cape Colony, Mozambique.— Type locality: "le Cap de Bonne-Espérance."

176. **Odynerus spoliatus** P. CAMERON, Ann. Transvaal, Mus., II, 3, 1910, p. 165 (♀ ♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 497 and 511; Pl. XCI, fig. 12.

Odynerus longstaffi C. T. BINGHAM, Trans. Ent. Soc. London, 1912, p. 378 (♂). G. B. LONGSTAFF, Butterfly Hunting in many Lands, 1912, Pl. II, fig. 6.

Cape Colony, Transvaal, Natal, Mashonaland.— Type locality: "Kranspoort."

177. **Odynerus stellenboschensis** P. CAMERON, Trans. South African Philos. Soc., XV, pt. 4, 1905, p. 233 (♂).

Odynerus stellaboschensis G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 496.

Cape Colony.— Type locality: "Stellenbosch."

178. **Odynerus stigma** H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 219 (♂). ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 681 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 99; Gen. Ins. Vesp., 1904, p. 55.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. IX, fig. 12 (♀).

Abyssinia, Egypt.— Type locality: "Abyssinie."

179. **Odynerus synagroides** (H. DE SAUSSURE).

Rygchium synagroides H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 103; Pl. XIV, figs. 2 and 2*a* (♂).

Rhynchium synagroides F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 207 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 174; Pl. IV, figs. 13 and 14 (♀ ♂). RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 32. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Ann. Mag. Nat. Hist., (7), X, 1902, p. 221. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 272; Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lg. 10, 1912, p. 293; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 344. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 32 (ethology).

Rhynchium sichelii H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 176 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Synagris odontophora A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 21; Pl. I, figs. 1 and 2 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31.

Rhynchium odontophorum F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250.

Bassam, Bas-Dahomey, Gaboon, Spanish Guinea, Belgian Congo, Angola, Cape Colony, Transvaal, Delagoa Bay, Southern Arabia.— Type locality: "Gabon."

180. **Odynerus tectus** (Fabricius) H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 258. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. Dalla Torre, Cat., IX, Vesp., 1894, p. 100; Gen. Ins. Vesp., 1904, p. 55. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 494.

Vespa tecta Fabricius, Spec. Insect., I, 1781, p. 466.

Africa.— Type locality: "in Africa æquinoctiali."

181. **Odynerus tessmannianus** (A. v. Schulthess).

Rhynchium tessmannianum A. v. Schulthess, Soc. entomol., XXVIII, 1913, p. 2 (♀); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 346, figs. 5 and 6 (♀); Deutsche entom. Zeitschr., 1914, p. 292.

Spanish Guinea.— Type locality: "Uelleburg."

182. **Odynerus trilobus** (Fabricius) Lepeletier, Hist. nat. Ins. Hym., II, 1841, p. 635 (♀ ♂). H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 186; III, Suppl., 1854, p. 232; Reise d. Novara, Zool., II, 1, 1867, Hym., p. 10 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 164; Pl. iv, fig. 15 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 66. Dalla Torre, Cat., IX, Vesp., 1894, p. 102; Gen. Ins. Vesp., 1904, p. 56. G. Meade Waldo, Trans. Linn. Soc. London, (2), XV, Zool., pt. 1, 1912, p. 43.

Vespa triloba Fabricius, Mant. Insect., I, 1787, p. 290.

Odynerus chagosensis P. Cameron, Trans. Linn. Soc. London, (2), XII, Zool., pt. 1, 1907, p. 73 (♀ ♂).

Odynerus cœnocephalus P. Cameron, Trans. Linn. Soc. London, (2), XII, Zool., pt. 1, 1907, p. 72 (♀ ♂).

Madagascar, Mauritius, Réunion, Chagos Island, (East Indies, China, South Africa?, Ténériffe?).— Type locality: "China."

183. **Odynerus tripunctatus** (Fabricius) Lepeletier, Hist. nat. Ins. Hym., II, 1841, p. 620 (♀ ♂). H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 196; III, Suppl., 1854, p. 240. Ed. André, Spéc. Hym., Eur. Algér., II, fasc. 24–26, 1886, p. 892. Dalla Torre, Cat., IX, Vesp., 1894, p. 102; Gen. Ins. Vesp., 1904, p. 56.

Vespa tripunctata Fabricius, Mant. Insect., I, 1787, p. 290.

Algeria, Egypt.— Type locality: "in Babaria."

184. **Odynerus troglodytes** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 249 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Dalla Torre, Cat., IX, Vesp., 1894, p. 103; Gen. Ins. Vesp., 1904, p. 56. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 488.

Senegal.— Type locality: "le Sénégal."

185. **Odynerus tropicalis** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 214; Pl. xix, fig. 5 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. Dalla Torre, Cat., IX, Vesp., 1894, p. 103; Gen. Ins. Vesp., 1904, p. 56. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 494. A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 63. E. Roubaud, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 37–43 (ethology).

Abyssinia, Belgian Congo, Dahomey.— Type locality: "l'Abyssinie."

186. **Odynerus ueleensis** J. Bequaert. See p. 170 (♀ ♂).

Belgian Congo.— Type locality: Vankerckhovenville.

187. **Odynerus uncatus** (A. Tullgren).

Synagris uncata A. Tullgren, Ark. f. Zool., I, 1904, p. 449; Pl. xxv, figs. 11 *a-b* (♀).

Rhynchium uncatum F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 316.

Cameroon.— Type locality: "Kitta."

188. **Odynerus vaalensis** P. Cameron, The Entomologist, XXXVIII, 1905, p. 153 (♂). G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 495.

Transvaal.— Type locality: "Transvaal."

189. **Odynerus ventralis** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 173; Pl. iv, fig. 17; Pl. xvii, figs. 9 and 9*c* (♀ ♂).

Odynerus synagroides H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 198; Pl. xviii, fig. 2 (♀); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 223 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 289 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 99; Gen. Ins. Vesp., 1904, p. 55. W. A. Schulz, Zoolog. Ann. Würzburg, IV, 1911, p. 199.

Synagris tropidia A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 20; Pl. i, figs. 3 and 5 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554.

Rhynchium tropidium F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250; Pl. v, figs. 22, 27, and 29.

Senegal, Gaboon, Belgian Congo, Abyssinia, Somaliland, Madagascar.— Type locality: "le Sénégal."

190. **Odynerus versicolor** (W. F. Kirby) A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 57.

Rhynchium versicolor W. F. Kirby, Bull. Liverpool Mus., III, 1900, p. 19 (♀); Nat. Hist. of Sokotra, by H. O. Forbes, Zool. Hym., 1903, p. 247; Pl. xv, fig. 12 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 35. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249.

Odynerus stiraspis P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 187 (♂). G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 487, 488, 492, and 496. A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 17.

Odynerus wellmani G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VI, 1910, p. 106 (♀); Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 497.

Sokotra Island, British and German East Africa, Katanga, Angola, Northern Transvaal.— Type locality: "Homhil, East Sokotra, 1500 ft."

191. **Odynerus vulneratus** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 248 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 104; Gen. Ins. Vesp., 1904, p. 57. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 493.

Cape Colony (?).— Type locality: "l'Espagne ou le Cap de Bonne-Espérance."

192. **Odynerus walkeri** (Dalla Torre).

Rhynchium walkeri Dalla Torre, Gen. Ins. Vesp., 1904, p. 35.

Rhynchium ardens Walker, List Hym. Egypt, 1871, p. 31 (♀ ♂) (*nec* Guérin, 1848). Dalla Torre, Cat., IX, Vesp., 1894, p. 43.

Arabia.— Type locality: "Mount Sinai."

193. **Odynerus whiteanus** P. Cameron, Trans. South African Philos. Soc.,

XV, 4, 1905, p. 232 (♀ ♂); Rec. Albany Mus., I, 5, 1905, p. 325. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 492.

Cape Colony.— Type locality: " Grahamstown."

194. **Odynerus xanthurus** (H. de Saussure).

Rhynchium xanthurum H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 182 (♀); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 209 (♀ ♂); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 173; Pl. iv, fig. 12 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. Dalla Torre, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Cape Colony, Caffraria.— Type locality: " Cap de Bonne-Espérance."

195. **Odynerus yngvei** P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 188 (♂). A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

East Africa.— Type locality: " Kilimandjaro: Kibonoto, 1300–1900 m."

I have followed A. v. Schulthess in considering *O. yngvei* as distinct from *O. sjöstedti* Cameron. G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53, unites both as different sexes of the same species.

196. **Odynerus zonatus** (Walker).

Rhynchium zonatum Walker, List Hym. Egypt, 1871, p. 31 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Arabia.— Type locality: " Wady Ferran."

The following African species of *Odynerus* can not be placed in their subgenera.

197. **Odynerus albifer** Walker, List Hym. Egypt, 1871, p. 36 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 51; Gen. Ins. Vesp., 1904, p. 39.

Egypt.— Type locality: " Cairo."

198. **Odynerus alienus** Walker, List Hym. Egypt, 1871, p. 39 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 51; Gen. Ins. Vesp., 1904, p. 39.

Arabia.— Type locality: " Wâdy Gennèh."

199. **Odynerus cingulifer** Walker, List Hym. Egypt, 1871, p. 37 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 60; Gen. Ins. Vesp., 1904, p. 42.

Egypt.— Type locality: " Harkeko."

200. **Odynerus cognatus** Walker, List Hym. Egypt, 1871, p. 35 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 61; Gen. Ins. Vesp., 1904, p. 42.

Arabia.— Type locality: " Wâdy Ferran."

201. **Odynerus concinnulus** Walker, List Hym. Egypt, 1871, p. 38 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 61; Gen. Ins. Vesp., 1904, p. 42.

Egypt.— Type locality: " Dahleck (Island)."

202. **Odynerus disjunctus** Walker, List Hym. Egypt, 1871, p. 39 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 65; Gen. Ins. Vesp., 1904, p. 44.

Egypt.— Type locality: " Cairo."

203. **Odynerus diversus** Walker, List Hym. Egypt, 1871, p. 34 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 65; Gen. Ins. Vesp., 1904, p. 44.

Arabia.— Type locality: " Wâdy Gennèh."

204. **Odynerus dotatus** Walker, List Hym. Egypt, 1871, p. 35 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 65; Gen. Ins. Vesp., 1904, p. 44.

Arabia.— Type locality: " Wâdy Gennèh."

205. **Odynerus exustus** Walker, List Hym. Egypt, 1871, p. 35 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 67; Gen. Ins. Vesp., 1904, p. 45.

Arabia.— Type locality: " Mount Sinai."

206. **Odynerus flavus** Walker, List Hym. Egypt, 1871, p. 33 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 69; Gen. Ins. Vesp., 1904, p. 45.

Arabia.— Type locality: " Wâdy Ferran."

207. **Odynerus fumipennis** Walker, List Hym. Egypt, 1871, p. 38 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 69; Gen. Ins. Vesp., 1904, p. 45.

Egypt.— Type locality: " Cairo."

208. **Odynerus guttulosus** Walker, List Hym. Egypt, 1871, p. 36 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 71; Gen. Ins. Vesp., 1904, p. 46.

Egypt.— Type locality: " Harkeko."

209. **Odynerus humbei** Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 73; Gen. Ins. Vesp., 1904, p. 47. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Angola.— Type locality: " Angola."

210. **Odynerus inornatus** Walker, List Hym. Egypt, 1871, p. 37 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47.

Egypt.— Type locality: " Cairo."

211. **Odynerus instabilis** F. Smith, Cat. Hym. Brit. Mus., V, 1857, p. 73 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 503.

Gambia.— Type locality: " Gambia."

212. **Odynerus notabilis** Walker, List Hym. Egypt, 1871, p. 38 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 82; Gen. Ins. Vesp., 1904, p. 50.

Egypt.— Type locality: " Dahleck (Island)."

213. **Odynerus obscurus** Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 204 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 83; Gen. Ins. Vesp., 1904, p. 50. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Angola.— Type locality: " Angola."

214. **Odynerus privatus** Walker, List Hym. Egypt, 1871, p. 34 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 90; Gen. Ins. Vesp., 1904, p. 52.

Arabia.— Type locality: " Wâdy Gennèh."

215. **Odynerus raffrayi** Radoszkowsky, Hor. Soc. Ent. Rossicæ, XII, 2, 1876, p. 145 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 92; Gen. Ins. Vesp., 1904, p. 52. G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Abyssinia.— Type locality: " Abyssinie."

216. **Odynerus rotundatus** Walker, List Hym. Egypt, 1871, p. 37 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 94; Gen. Ins. Vesp., 1904, p. 53.

Egypt.— Type locality: " Cairo."

217. **Odynerus selectus** Walker, List Hym. Egypt, 1871, p. 34 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54.

Arabia.— Type locality: " Mount Sinai."

218. **Odynerus stipatus** Walker, List Hym. Egypt, 1871, p. 36 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 99; Gen. Ins. Vesp., 1904, p. 55.

Egypt.— Type locality: " Cairo? "

219. **Odynerus tegularis** P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 164 (♀). (*nec* Morawitz, 1885; *nec* Cameron, 1905).

Transvaal.— Type locality: " Saleka."

Cameron used for two different new species the preoccupied name "*tegularis*"; the first of these species has been renamed *cameroni* by Schulz, 1906; I refrain from renaming the other, because it may prove a synonym of some other described form, or even not belong to the genus *Odynerus*.

220. **Odynerus tinctus** WALKER, List Hym. Egypt, 1871, p. 34 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 101; Gen. Ins. Vesp., 1904, p. 56.

Arabia.— Type locality: "Wâdy Gennèh."

221. **Odynerus torridus** WALKER, List Hym. Egypt, 1871, p. 33 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 101; Gen. Ins. Vesp., 1904, p. 56.

Arabia.— Type locality: "Mount Sinai."

21. **Pterochilus** KLUG

In Weber and Mohr, Beiträge z. Naturk., I, 1805, p. 143.

Pterocheilus PANZER, Rev. Insectf. Deutschl., II, 1806, p. 145.

Genotype: *Vespa phalerata* Panzer, 1797.

1. **Pterochilus biglumis** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 243; Pl. XXI, fig. 3 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 87. DALLA TORRE, Cat., IX, Vesp., 1894, p. 105; Gen. Ins. Vesp., 1904, p. 58.

Cape Colony (?).— Type locality: "le Cap de Bonne-Espérance?"

2. **Pterochilus capensis** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 323; Pl. XV, figs. 11 and 11*a* (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 88. DALLA TORRE, Cat., IX, Vesp., 1894, p. 105; Gen. Ins. Vesp., 1904, p. 58.

Cape Colony.— Type locality: "le Cap de Bonne-Espérance."

3. **Pterochilus dives** RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 1876, p. 145 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 106; Gen. Ins. Vesp., 1904, p. 58.

Egypt.— Type locality: "Egypte."

4. **Pterochilus eurystomus** (F. KOHL).

Pterocheilus eurystomus F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 257; Pl. II, fig. 9; Pl. V, figs. 9 and 11; Pl. VIII, fig. 15 (♀).

Sokotra Island.— Type locality: "Ras Shoab."

5. **Pterochilus insignis** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 324; Pl. XV, figs. 12 and 12*a* (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 88. DALLA TORRE, Cat., IX, Vesp., 1894, p. 106; Gen. Ins. Vesp., 1904, p. 58. W. L. DISTANT, A Naturalist in the Transvaal, 1892, p. 210.

Odynerus insignis C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 46.

Cape Colony, Transvaal.— Type locality: "le Cap de Bonne-Espérance."

6. **Pterochilus iterabilis** (F. KOHL).

Pterocheilus iterabilis F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 259; Pl. II, fig. 12; Pl. VIII, figs. 2, 13, and 14 (♀).

Egypt.— Type locality: "Wady Hoff, Helouah."

7. **Pterochilus major** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 244; Pl. XXI, fig. 1 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 87. DALLA TORRE, Cat., IX, Vesp., 1894, p. 107; Gen. Ins. Vesp., 1904, p. 58.

Cape Colony.— Type locality: "le Cap de Bonne-Espérance."

8. **Pterochilus savignyi** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 248 (♀) (without description).

Savigny, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. viii, fig. 8 (♀).

Egypt.— Type locality: unknown.

9. **Pterochilus versicolor** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 78, fig. (♀).

Southeastern Belgian Congo (Katanga).— Type locality: " Bunkeya."

Odynerus adonis G. Meade Waldo is probably a synonym of this species.

22. **Synagris** Latreille

Hist. nat. Crust. Ins., III, (an X), 1802, p. 360.

Genotype: *Vespa cornuta* Linné, 1758.

Subgenus 1. **Pseudagris** H. de Saussure

Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 203 (as a division). F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 243 (as a subgenus).

Type: *Synagris carinata* H. de Saussure, 1863.

1. **Synagris aterrima** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 97 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235 and 246; Pl. i, fig. 2; Pl. ii, fig. 9 (♀).

Eastern Belgian Congo.— Type locality: " Urwald Moera."

2. **Synagris carinata** H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 203, Pl. ii, figs. 18*c* and 18*m* (♀, erroneously described as ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235 and 244 (♀).

Natal.— Type locality: " Port Natal."

3. **Synagris versicolor** A. v. Schulthess, Soc. entomol., XXIX, 1914, p. 4 (♀); Deutsche entom. Zeitschr., 1914, p. 291. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235 and 244 (♀).

Sierra Leone, Togo, Cameroon, Belgian Congo, Fernando Po.— Type locality: " Sierra Leone."

3*a*. var. **meade-waldoi** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 97 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235 and 245 (♀).

Uganda.— Type locality: " Budongo Forest, Unyoro."

Subgenus 2. **Rhynchagris** F. Maidl

Anzeiger Ak. Wiss. Wien, 1914, p. 97; Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 247.

Type: *Synagris vicaria* Stadelmann, 1898.

4. **Synagris vicaria** H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 32 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 31. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 222, fig. 3; p. 227, fig. 18; pp. 235, 239, and 248; Pl. i, fig. 3; Pl. ii, figs. 10 and 11 (♀ ♂).

Belgian Congo (Katanga), German East Africa, North East Rhodesia, Nyasaland.— Type locality: " Deutsch-Ostafrika."

4*a*. var. **luteopicta** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 97 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235, 239, and 249 (♀ ♂).

Uganda, British and German East Africa.— Type locality: " south of Lake George."

Subgenus 3. **Paragris** H. de Saussure.

Et. fam. Vesp., III, Suppl., 1854, p. 156 (as a division). F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 525 (as a subgenus).

Synagris divisio *Hypagris* H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 157.

Synagris divisio *Antagris* H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 181.

Type: *Synagris analis* H. de Saussure, 1852.

5. **Synagris abyssinica** Guérin, in Lefebvre, Voy. Abyssinie, IV, Zool., pt. VI, 1848, p. 360 (♀ ♂). Reiche et Fairmaire, in Ferret et Galinier, Voy. Abyssinie, III, 1849, p. 453; Atlas, Zool., Pl. xxix, figs. 9 and 10 (♂). H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 84 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 192. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. Dalla Torre, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30. E. Cannaviello, Bull. Soc. ent. Italiana, XXXII, 1900, p. 297. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 227, fig. 17; pp. 235, 239, and 273; Pl. iv, figs. 41 and 42 (♀ ♂).

Synagris æthiopica H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 200; Pl. ii, fig. 14 (♀). G. Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 292. Dalla Torre, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30.

Synagris fervida H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 199; Pl. ii, fig. 13 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31.

Synagris minuta H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 85; Pl. v, fig. 2*c*; Pl. xiii, figs. 7 and 7 *a–b* (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 192; Pl. ii, fig. 8 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp. (1907–08), IV, Lf. 10, 1912, p. 292.

Synagris pentameria H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 87; Pl. xiii, figs. 8 and 8 *a–b* (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 197 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Gribodo, Ann. Mus. civ. Genova, XVI, 1881, p. 240. Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31; Pl. iii, fig. 8.

Synagris xanthura P. Cameron (*pro parte*), Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 183 (see A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

Abyssinia, Uganda, Northeastern Belgian Congo, British East Africa, Transvaal, Orange Colony, Natal, Cape Colony, German Southwest Africa.— Type locality: " Abyssinie."

5*a*. var. **albofasciata** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 275 (♀ ♂).

British East Africa, Northeastern Belgian Congo (Angola ?, Guinea?).— Type locality: " Nyangori N. Kavirondo."

5*b*. var. **emarginata** (H. de Saussure) F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 275 (♀ ♂).

Synagris emarginata H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 157 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 195. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 47 and 68.

Abyssinia, Belgian Congo (Katanga, northeastern districts, Lower Congo), Uganda, British and German East Africa, North East Rhodesia, Nyasaland, (Madagascar?).— Type locality: " l'Afrique."

6. **Synagris æstuans** (Fabricius) Serville, in Palisot de Beauvois, Ins. recueillis en Afrique et Amérique, 1805, p. 260; Atlas, Hymén., Pl. x, fig. 5 (♀). Lepeletier, Encycl. méthod. Insect., X, 1825, p. 510 (♀); Hist. nat. Ins. Hym., II, 1841, p. 594 (♀). H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 81 (♀ ♂); III, Suppl., 1854, p. 155; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 188 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36. Dalla Torre, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30. W. A. Schulz, Spolia Hymenopterologica, 1906, pp. 215 and 321. A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 239, 243, and 283; Pl. iv, figs. 47 and 48 (♀ ♂).

Vespa æstuans Fabricius, Spec. Insect., II, 1781, p. 462 (♀); Mant. Insect., I, 1787, p. 289 (♀); Syst. Piez., 1804, p. 258 (♀). Gmelin, in Linné, Syst. Nat., ed. 13a, I, 5, 1790, p. 2752 (♀). Olivier, Encycl. méthod. Insect., VI, 1791, p. 683 (♀).

Synagris amplissima F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337; Pl. xv, fig. 93; Pl. xvi, fig. 102 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30. J. C. Bridwell, Proc. Hawaiian Ent. Soc., III, 4, (1916), 1917, p. 261.

Synagris ornata A. Mocsáry, Ann. Mus. nat. Hungarici, IV, 1906, p. 199 (♀).

Sierra Leone, Togo, Cameroon, Fernando Po, French Congo, Belgian Congo, Uganda.— Type locality: " in Africa æquinoctiali."

6*a*. var. **rufa** H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 31; Pl., fig. 9 (♀). F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 243, and 286 (♀ ♂).

Synagris amplissima A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 506 (♀ ♂).

German East Africa, Nyasaland.— Type locality: Usambara."

7. **Synagris analis** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 86; Pl. xiii, figs. 5 and 5*a* (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 195; Pl. ii, fig. 10 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Dalla Torre, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30; Pl. iii, fig. 7. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 47 and 68. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 224, figs. 9 and 10; pp. 236, 240, and 253; p. 322, figs. 22–24; Pl. i, fig. 4; Pl. ii, figs. 12–16 (♀ ♂).

Synagris abdominalis H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 157; Pl. viii, fig. 7 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 202. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Dalla Torre, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30.

Synagris dubia H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 202; Pl. ii, fig. 17 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31.

Synagris intermedia P. Cameron, Rec. Albany Mus., I, 4, 1905, p. 207 (♀ ♂).

Synagris heydeniana H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 194; Pl. ii, fig. 9 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 272. E. Zavattari, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 555, 1907, p. 3.

Synagris tarsalis Gerstæcker, Arch. f. Naturg., XXXVII, 1, 1871, p. 350 (♀ ♂); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 322. Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 30. A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lf. 10, 1912, p. 293.

Synagris xanthura H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 155 (♀); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 187. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36. Gerstæcker, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 464. Gribodo, Ann. Mus. civ. Genova, XXI, 1884, p. 292; Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 95. Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 613; (2), XIX, 1898, pp. 33 and 594. Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 272. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 30. E. Zavattari, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 548, 1907, p. 1; No. 550, 1907, p. 2. P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 160.

Eritrea, Abyssinia, Uganda, Eastern Belgian Congo, British and German East Africa, Zanzibar, North East Rhodesia, Nyasaland, Mozambique, Transvaal, Basutoland, Natal, Cape Colony, Kabinda (Chinchoxo).[1] (The occurrence of this species in Madagascar is extremely doubtful).— Type locality: l'Abyssinie."

7a. var. **nigroclypeata** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 97 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236 and 255 (♀ ♂).

German Southwest Africa.— Type locality: " Damaraland."

8. **Synagris calida** (Linné) Serville, in Palisot de Beauvois, Insectes recueillis en Afrique et Amérique, 1805, p. 261; Atlas, Hymén., Pl. x, figs. 6 and *6a–b* (♀ ♂). Jurine, Nouv. Méth. class. Hym., 1807, p. 169 (♀ ♂). Lepeletier, Encycl. méthod. Insect., X, 1825, p. 509 (♀ ♂); Hist. nat. Ins. Hym., II, 1841, p. 594 (♀ ♂). Guérin, Iconogr. Règne anim., II (Atlas), 1835, Pl. lxxii, fig. 3; III (Texte), Insect., 1844, p. 446; in Lefebvre, Voy. en Abyssinie, IV, Zool., pt. VI, 1848, p. 362. F. Smith, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 128 (ethology); Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 35; Pl. vi, fig. 3. Gueinzius, Trans. Ent. Soc. London, (2), V, 1858, Proc., p. 9 (ethology). Taschenberg, Zeitschr.

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[1] **Chinchoxo is a locality near Landana in the Portuguese territory of Kabinda; not in Angola as stated by Maidl.**

f. die ges. Naturw., XXXIX, 1872, pp. 1–5 (ethology). Radoszkowsky, Hor. Soc. ent. Rossicæ, XII, 2, 1876, p. 145. Dalla Torre, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554. Cannaviello, Bull. Soc. ent. Italiana, XXXII, 1900, p. 296. P. Cameron, Rec. Albany Mus., I, 4, 1905, p. 208; Ann. Transvaal Mus., II, 3, 1910, p. 160. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 265; Pl. iii, figs. 29–34 (♀ ♂).

Synagris bellicosa H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 84 (♀ ♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 191; Pl. ii, fig. 7. F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Dalla Torre, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30. A. Tullgren, Ark. f. Zool., I, 1904, p. 451.

Vespa calida Linné, Syst. Nat., ed. 10a, I, 1758, p. 574; ed. 12a, I, 2, 1767, p. 952. Fabricius, Syst. Entom., 1775, p. 366; Spec. Insect., I, 1781, p. 462; Mantis. Ins., I, 1787, p. 289; Entom. System., II, 1793, p. 262; Syst. Piez., 1804, p. 259. Ph. L. Müller, in Linné, Vollst. Natursyst., V, 2, 1775, p. 887. Gmelin, in Linné, Syst. Nat., ed. 13a, I, 5, 1790, p. 2759. Christ, Naturg. d. Insekt., 1791, p. 225. Olivier, Encycl. méthod. Insect., VI, 1791, p. 683.

Vespa carbonaria de Geer, Mém. Hist. Ins., VII, 1778, p. 609; Pl. xlv, fig. 9. Goeze, in de Geer, Abh. Gesch. Insekt., VII, 1783, p. 217; Pl. xlv, fig. 9. Retzius, Caroli de Geer Gen. Spec. Ins., 1783, p. 241.

Synagris combusta H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 185; Pl. ii, fig. 4 (♀). C. Ritsema, Tijdschr. v. Entom., XVII, 1874, p. 200. Gribodo, Ann. mus. civ. Genova, XXI, 1884, p. 291. Dalla Torre, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30. A. v. Schulthess, Deutsche entom. Zeitschr., 1914, p. 291.

Vespa crabro microrrhœa Christ, Naturg. d. Insekt., 1791, p. 218; Pl. xviii, fig. 6.

Synagris mandibularis H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 184; Pl. ii, fig. 3 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp. (1907–08), IV, Lf. 10, 1912, p. 292.

Synagris sicheliana H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 183; Pl. II, figs. 1*c* and 1*m* (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 344. E. Roubaud, C. R. Ac. Sc. Paris, CXLVII, 1908, pp. 696–697 (ethology); Ann. Soc. ent. France, LXXIX, 1910, pp. 3–7; Pl. i, figs. 1 and 3; Pl. ii (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 3–16 (ethology). J. C. Bridwell, Proc. Hawaiian Ent. Soc., III, 4, (1916), 1917, p. 261. A. v. Schulthess, Deutsche entom. Zeitschr., 1914, p. 291.

Synagris tetrameria H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 193 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31.

Senegal, Sierra Leone, Liberia, Gold Coast, Togo, Dahomey, Southern and Northern Nigeria, Cameroon, French Congo, Kabinda, Belgian Congo, Angola, Uganda, British and German East Africa, Cape Colony.— Type locality: " ad Cap. b. spei."

9. **Synagris crassipes** F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 338; Pl. xv, fig. 90; Pl. xvi, figs. 112 and 113 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. Ed. André, Rev. d'Ent. Caen, XIV,

1895, p. 354 (♂). A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343; Deutsche entom. Zeitschr., 1914, p. 291. R. du Buysson, Rev. d'Ent. Caen, XXVIII, 1909, p. 178 (♀ ♂). F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 281, fig. 19; Pl. iv, figs. 45 and 46 (♀ ♂).

Cameroon, Spanish Guinea, French Congo, Belgian Congo, Uganda.— Type locality: " Chutes de Samlia, Riv. N. Gamio."

10. **Synagris elephas** Ed. André, Rev. d'Ent. Caen, XIV, 1895, p. 353 (♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 31. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 239 and 261 (♂).

Sierra Leone.— Type locality: " Sierra Leone."

11. **Synagris fasciata** A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 505 (♀ ♂). F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 299; Pl. iv, fig. 52; Pl. v, fig. 53 (♀ ♂).

German East Africa.— Type locality: " Ukami."

12. **Synagris huberti** H. de Saussure, Et. fam. Vesp., III, Suppl., 1854, p. 156; Pl. viii, figs. 8 and 8*a* (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 189 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 222, fig. 1; pp. 238, 242, and 291; Pl. iv, figs. 49 and 50 (♀ ♂).

Synagris quadripunctata A. Tullgren, Ark. f. Zool., I, 1904, p. 450; Pl. xxv, figs. 12*a* and 12*b* (♀).

Sierra Leone, Gold Coast, Togo, Cameroon, French Congo.— Type locality: " l'Afrique tropicale ou l'Arabie."

12*a*. var. **bimaculata** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238 and 294 (♀).

Eastern Belgian Congo, Uganda.— Type locality:?

12*b*. var. **clypeata** (A. Mocsáry).

Synagris clypeata Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 503 (♀). R. du Buysson, Rev. d'Ent. Caen, XXVII, 1908, p. 213 (ethology) (♂). A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343.

Synagris huberti var. *clypeata* F. Maidl (*pro parte*), Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 241, 242, and 289 (♀ ♂).

Togo, Cameroon, Spanish Guinea, French Congo, Belgian Congo.— Type locality: " Gabun."

12*c*. var. **nigricans** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 293 (♀ ♂).

Uganda.— Type locality:?

13. **Synagris kohli** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 259; Pl. ii, figs. 19–23 (♀ ♂).

Togo, Cameroon, Spanish Guinea, Belgian Congo, Uganda, German East Africa. — Type locality: " Bismarckburg."

14. **Synagris maxillosa** H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 196; Pl. ii, fig. 11 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 257; Pl. ii, figs. 17 and 18 (♀ ♂).

Senegal, Cameroon, Belgian Congo, Cape Colony.— Type locality: "Sénégal."

15. **Synagris mirabilis** Guérin, in Lefebvre, Voy. en Abyssinie, IV, Zool., pt. VI, 1848, p. 359; Atlas, Pl. viii, fig. 8 (♂). Reiche et Fairmaire, in Ferret et Galinier, Voy. en Abyssinie, III, 1849, p. 453; Atlas, Zool., Pl. xxix, fig. 11. H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 82 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 181 (♂). F. Smith, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 128 (ethology); Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36; Pl. vi, fig. 2. W. L. Distant, A Naturalist in the Transvaal, 1892, p. 210. Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29, 30, and 31 (♀ ♂). A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 272. Cannaviello, Bull. soc. ent. Italiana, XXXII, 1900, p. 297. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 47 and 68. P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 160. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw., Kl., XCI, 1914, p. 224, figs. 11 and 12; pp. 238, 242, and 278; Pl. iv, figs. 43 and 44 (♀ ♂).

Synagris stuhlmanni H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 30 and 32 (♂). A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 508 (♀ ♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 31.

Eritrea, Abyssinia, Uganda, German East Africa, Zanzibar, North East Rhodesia, Nyasaland, Mozambique, Transvaal, Natal.— Type locality: "Abyssinie."

16. **Synagris negusi** R. du Buysson, Rev. d'Ent. Caen, XXV, 1906, p. 107 (♀ ♂). F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 224, figs. 7 and 8; pp. 236, 239, and 271; Pl. iv, figs. 38–40 (♀ ♂).

Eastern Belgian Congo, Uganda, British and German East Africa, Mozambique. — Type locality: "Naivasha."

17. **Synagris ornatissima** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238 and 297; Pl. iv, fig. 51 (♀).

Eastern Belgian Congo.— Type locality: "Urwald Mawambi."

18. **Synagris rufopicta** A. Tullgren, Ark. f. Zool., I, 1904, p. 448; Pl. xxiv, figs. 10*a* and 10*b* (♀).

Synagris imitator R. du Buysson, Rev. d'Ent. Caen, XXVII, 1909, p. 213 (♀).

Synagris huberti var. *clypeata* F. Maidl (*pro parte*), Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 241, 242, and 289 (♀).

Cameroon, Spanish Guinea (San Benito River), Belgian Congo.— Type locality: "Kitta."

I was unable to find the original description of *Rhynchium imitator* P. Cameron, 1909, which according to G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XIV, 1914, p. 405, is a *Synagris*.

18*a*. var. **mimetica** J. Bequaert. See p. 226 (♀).

Belgian Congo.— Type locality: Medje.

19. **Synagris spiniventris** (Illiger) F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 261; Pl. ii, fig. 24; Pl. iii, figs. 25–28 (♀ ♂).

Vespa spiniventris Illiger, Magaz. f. Insektenk., I, 1802, p. 190 (♂, described as a ♀).

Synagris æquatorialis H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 81; Pl. xiii, fig. 4 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, pp. 183 and 198; Pl. ii, fig. 2 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36. Dalla Torre, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30.

Synagris affinis H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 186; Pl. ii, fig. 5 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30. F. Kohl, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 189. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 32.

Synagris calida Reiche et Fairmaire, in Ferret et Galinier, Voy. en Abyssinie, III, 1849, p. 452; Atlas, Zool., Pl. xxix, figs. 7 and 8 (♂). H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 79; Pl. v, figs. 2*a* and 2*b*; Pl. xiii, figs. 2 and 2 *a–c* (♀ ♂); III, Suppl., 1854, p. 155; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 181 (♂). Maidron, Quelques mots sur les Guêpes maçonnes, St. Louis, Sénégal, 1879 (Moniteur du Sénégal et Dépendances, 15 avril 1879) (ethology). E. Roubaud, C. R. Ac. Sc. Paris, CXLVII, 1908, p. 695 (ethology); Ann. Soc. ent. France, LXXIX, 1910, pp. 2–3; Pl. i, figs. 2 and 4; Pl. iv, figs. 4 and 5 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 3–16 (ethology).

Synagris capitata H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 189 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30.

Synagris dentata H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 80; Pl. xiii, figs. 3 and 3*a* (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 197; Pl. ii, figs. 12*c* and 12*m* (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 35. Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 68.

Synagris ferox H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 201 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31.

Synagris xanthura P. Cameron (*pro parte*), Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 183 (see A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

Senegal, Gambia, Bissao, Sierra Leone, Gold Coast, Togo, Dahomey, Southern Nigeria, Northern Nigeria, Cameroon, French Congo, Belgian Congo, Uganda, British East Africa.— Type locality: "Sierra Leone."

20. **Synagris spinosuscula** H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 85; Pl. xiii, figs. 6 and 6*a* (♀ ♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 189; Pl. ii, figs. 6*c* and 6*m* (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 224, fig. 4; pp. 236, 240, and 269; Pl. iii, figs. 35–37 (♀ ♂).

Synagris ruppelliana H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 201; Pl. ii, fig. 16 (♀). Gribodo, Ann. Mus. civ. Genova, XVI, 1881, p. 240. Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31.

Abyssinia, Eritrea, British East Africa.— Type locality: "l'Abyssinie."

Subgenus 4. **Synagris** Latreille, *sensu stricto*

Type: *Vespa cornuta* Linné, 1758.

21. **Synagris cornuta** (Linné) Latreille, Hist. nat. Crust. Ins., III, 1802, p. 360; XIII, 1805, p. 344 (♀ ♂); Gen. Crust. et Ins., IV, 1809, p. 135 (♂). Klug, Magaz. Ges. naturf. Fr. Berlin, II, 1808, p. 51. Lamarck, Hist. nat. Anim. s. vert., IV, 1817, p. 82; *ibid.*, ed. 2a, II, 1835, p. 299. Griffith and Pidgeon, in Cuvier,

The Class Insecta, II, 1832, p. 575; Pl. cvi, fig. 18; Pl. cvii, fig. 1 (♂). WESTWOOD, in Drury, Illustr. Nat. Hist., ed. 2a, IV, 1837, p. 98; Pl. xlviii, fig. 3. LEPELETIER, Encycl. méthod. Ins., X, 1825, p. 510 (♀ ♂); Hist. nat. Ins. Hym., II, 1841, p. 593 (♀ ♂). BLANCHARD, Hist. nat. des Insectes, 1840, p. 389. H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 82; Pl. xiii, fig. 1 (♀ ♂); iii, Suppl., 1854, p. 155; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 180. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36.— RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. A. SCHLETTERER, Ann. Soc. entom. Belgique, XXXV, 1891, p. 19. DALLA TORRE, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 31; Pl. iii, fig. 6. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 344; Pl. xvi, fig. 111. ED. ANDRÉ, Rev. d'Ent. Caen, XIV, 1895, p. 352 (ethology). C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 46. A. TULLGREN, Ark. f. Zool., I, 1904, p. 446. E. ROUBAUD, C. R. Ac. Sc. Paris, CXLVII, 1908, p. 696 (ethology); Ann. Soc. ent. France, LXXIX, 1910, pp. 7–16; Pl. iii, figs. 1–4; Pl. iv, fig. 1 (ethology); Annual Rept. Smithsonian Inst. Washington for 1910, 1911, pp. 513–521 (ethology). A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp. (1907–08), IV, Lf. 10, 1912, p. 292; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343; Deutsche entom. Zeitschr., 1914, p. 291. W. A. SCHULZ, Berlin. ent. Zeitschr., LVII, 1912, p. 57. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 222, fig. 2; p. 224, fig. 5; p. 225, figs. 13 and 14; p. 227, figs. 15 and 16; pp. 237, 241, and 301; p. 282, fig. 19; Pl. i, figs. 5–8; Pl. v, figs. 54–56 (♀ ♂). J. C. BRIDWELL, Proc. Hawaiian Ent. Soc., III, 4, (1916), 1917, p. 261 (ethology).

Vespa cornuta LINNÉ, Syst. Nat., ed. 12a, I, 1758, p. 574 (♀ ♂); Mus. Ludov. Ulric., 1764, p. 409 (♀ ♂); Syst. Nat., ed. 12a, I, 2, 1767, p. 951 (♀ ♂). FABRICIUS, Syst. Entom., 1775, p. 363; Spec. Insect., I, 1781, p. 459 (♀ ♂); Mant. Insect., I, 1787, p. 287; Entom. Syst., II, 1793, p. 255 (♀ ♂); Syst. Piez., 1804, p. 252 (♀ ♂). PH. L. MÜLLER, in Linné, Vollst. Natursyst., V, 2, 1775, p. 885 (♀ ♂). GMELIN, in Linné, Syst. Nat., ed. 13a, I, 5, 1790, p. 2758 (♀ ♂). OLIVIER, Encycl. méthod. Insect., VI, 1791, p. 678. JURINE, Nouv. Méth. classer Hym., 1807, p. 169 (♀ ♂).

Apis cornuta DRURY, Illustr. Nat. Hist., II, 1773, p. 88; Pl. xlviii, fig. 3 (♂).

Vespa crabro cornuta CHRIST, Naturg. der Insekt., 1791, p. 214; Pl. xviii, fig. 2 (♀ ♂).

Synagris sericea SPINOLA, Insect. Ligur., II, 1808, p. 188, footnote (♀). H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 159; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 204. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31.

Sierra Leone, Gold Coast, Liberia, Grand Bassam, Togo, Côte d'Ivoire, Fernando Po, Cameroon, Spanish Guinea, French Congo, Belgian Congo, Kabinda, Angola, German East Africa. Its occurrence in South Africa is very doubtful.— Type locality: "in Indiis."

21*a*. var. **basalis** (MOCSÁRY) F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 305 (♀ ♂).

Synagris basalis A. MOCSÁRY, Ann. Mus. nat. Hungarici, IV, 1906, p. 198 (♀).

Synagris cornuta var. *ugandæ* G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 46 (♀ ♂).

Uganda, eastern Belgian Congo, British East Africa.— Type locality: "Uganda."

21*b*. var. **didieri** (R. DU BUYSSON) F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 304 (♀ ♂).

Synagris didieri R. DU BUYSSON, Rev. d'Ent. Caen, XVII, 1908, p. 214 (♀ ♂) (ethology).

Belgian Congo.— Type locality: " rive gauche du Congo, en aval du confluent de l'Irebou."

21*c*. var. **flavofasciata** J. Bequaert. See p. 210 (♀ ♂).

Belgian Congo.— Type locality: Medje.

21*d*. var. **ituriensis** J. Bequaert. See p. 209 (♀ ♂).

Belgian Congo.— Type locality: Risimu (Batama).

21*e*. var. **maculata** J. Bequaert. See p. 210 (♀).

Belgian Congo.— Type locality: Medje.

21*f*. var. **rufithorax** J. Bequaert. See p. 208 (♀).

Belgian Congo.— Type locality: Malela.

21*g*. var. **similis** J. Bequaert. See p. 210 (♀ ♂).

Belgian Congo.— Type locality: Medje.

22. **Synagris fulva** A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 503 (♀). F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 224, fig. 6; pp. 236, 240, and 312; Pl. v, figs. 62–64 (♀ ♂).

German East Africa.— Type locality: " Ukami."

22*a*. var. **trispinosa** (A. Tullgren) F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 241, and 312 (♀ ♂).

Synagris trispinosa A. Tullgren, Ark. f. Zool., I, 1904, p. 447; Pl. xxiv, figs. 9 *a–e* (♀ ♂). R. du Buysson, Rev. d'Ent. Caen, XXVIII, 1909, p. 178 (♂).

Cameroon.— Type locality: " Kitta."

23. **Synagris proserpina** Gribodo, Bull. Soc. ent. Italiana, XXIII, 1891, p. 265 (♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 30 (♀ ♂). F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 241, and 309; Pl. v, figs. 59–61 (♀ ♂).

German East Africa, Zanzibar.— Type locality: " Bagamojo."

23*a*. var. **nyassæ** (H. Stadelmann).

Synagris nyassæ H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 30; Pl., fig. 10 (♂). A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 507 (♀).

Synagris niassæ H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 31 (♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 31.

Synagris flavomaculata G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 454 (♀ ♂).

Synagris proserpina var. *niassæ* F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw., Kl., XCI, 1914, pp. 237, 241, and 310 (♀ ♂).

German East Africa, Nyasaland, North East Rhodesia, southeastern Belgian Congo (Katanga).— Type locality: " Nyassa-See."

24. **Synagris similis** F. Maidl, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 240, and 308; Pl. v, figs. 57 and 58 (♀ ♂).

Eastern Belgian Congo, German East Africa.— Type locality: " Urwald Beni und Moera."

24*a*. var. **maculata** F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 308 (♀ ♂).

Eastern Belgian Congo.— Type locality: " Urwald Beni und Moera."

These are probably only color variations of *S. cornuta*, and the same as *S. cornuta* var. *similis* J. Bequaert and *S. cornuta* var. *maculata* J. Bequaert.

23. **Rhynchalastor** G. MEADE WALDO

Ann. Mag. Nat. Hist., (8), VI, 1910, p. 110.
Genotype: *Rhynchalastor fuscipennis* G. Meade Waldo.

1. **Rhynchalastor fuscipennis** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VI, 1910, p. 110 (♀); Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 501.

Stenodynerus ferrugineus var. *mafiensis* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 73 (♀ ♂).

German East Africa, Delagoa Bay.— Type locality: " German East Africa."

2. **Rhynchalastor xanthosoma** (A. SCHLETTERER) G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 501.

Odynerus xanthosoma A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 24; Pl. I, fig. 10 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 105; Gen. Ins. Vesp., 1904, p. 57.

Belgian Congo.— Type locality: " Equateur-Congo."

24. **Alastor** LEPELETIER

Hist. nat. Ins. Hym., II, 1841, p. 668.
Genotype: *Alastor atropos* Lepeletier, 1841.

1. **Alastor braunsi** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 47 (♀ ♂).

Cape Colony.— Type locality: " Willowmore."

2. **Alastor bucida** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 257 (♀); III, Suppl., 1854, p. 328; Entom. Zeitg. Stettin, XXIII, 1862, p. 206. DALLA TORRE, Cat., IX, Vesp., 1894, p. 110; Gen. Ins. Vesp., 1904, p. 60.

Alastor lucida F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 89.

Cape Colony.— Type locality: " le Cap de Bonne-Espérance."

3. **Alastor promontorii** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 48 (♀ ♂).

Cape Colony.— Type locality: " Willowmore."

4. **Alastor schinzii** A. v. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 7, fig. (♂).

German Southwest Africa.— Type locality: " Ambola."

EPIPONINÆ

25. **Belonogaster** H. DE SAUSSURE

Et. fam. Vesp., II, Vesp., 1853, p. 235.

Raphigaster H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 12 (*nec* LEPELETIER, 1841).

Genotype: *Vespa juncea* Fabricius, 1781.

1. **Belonogaster abyssinicus** R. DU BUYSSON, Bull. Soc. ent. France, 1906, p. 190 (♀ ♂); Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214, 223, and 263;

Pl. IV, fig. 4; Pl. V, fig. 6 (♀ ♂) (ethology). A. v. SCHULTHESS, Soc. entomol., XXVII, 1912, p. 41; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 338.

Raphigaster junceus var. H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, Pl. II, fig. 2.

Abyssinia, Eritrea.— Type locality: " Abyssinie."

2. **Belonogaster apicalis** H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 208 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 230 (♀) (ethology).

Belonogaster malagassus var. H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt. a. M., XXVI, 2, 1900, p. 210.

Madagascar, Nossi Bé.— Type locality: " Madagascar."

3. **Belonogaster atratus** A. v. SCHULTHESS, Soc. entomol., XXVII, 1912, p. 41 (♀); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 337, fig. 1 (♀).

Cameroon.— Type locality: " Uelleburg."

4. **Belonogaster brachystomus** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 326, and 334; Pl. XV, fig. 78; Pl. XVII, fig. 136 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 219, 252, and 265 (♀ ♂).

German East Africa, Congo, Mozambique.— Type locality: " Delagoa Bay."

5. **Belonogaster brevipetiolatus** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 98; Pl. IV, fig. 1 (♀ ♂); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 207. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 321, 323, and 334; Pl. XV, fig. 83; Pl. XVI, figs. 95, 99, and 120 (♀ ♂). R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214, 227, and 263; Pl. VI, fig. 1 (♀ ♂) (ethology). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80.

Madagascar, Nossi Bé.— Type locality: " Fianarantsoa (pays des Betsileo.)"

6. **Belonogaster brunneus** C. RITSEMA, Tijdschr. v. Entom., XVII, 1874, p. 202 (♀). F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 334. DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 219, 245, and 264; Pl. VI, fig. 2 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. sc., Ins. Hym., III, Vesp., 1914, p. 162. W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 226.

Belonogaster distinguendus F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 323, 328, and 335; Pl. XV, figs. 79 and 94; Pl. XVI, fig. 98; Pl. XVII, fig. 141 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. W. A. SCHULZ, Hymenopt. Studien, 1905, p. 15.

Senegal, Liberia, Grand Bassam, Fernando Po, Togo, Cameroon, Gaboon, French Congo, Belgian Congo, German East Africa, Uganda.— Dalla Torre records this species by mistake from New Guinea.— Type locality: " Banana-Loango."

7. **Belonogaster buyssoni** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VII, 1911, p. 99 (♀).

Southern Nigeria.— Type locality: " Iganga Busoga."

Probably a synonym of *B. pusillus* Kohl.

8. **Belonogaster clypeatus** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 321, 328, and 335; Pl. XV, figs. 88 and 91; Pl. XVII, figs. 124, 144, and 149 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. A. v. SCHULTHESS,

Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 219, 244, and 264; Pl. ii, figs. 9 and 10; Pl. v, figs. 1–2 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. sc., Ins. Hym., III, Vesp., 1914, p. 162.

German and British East Africa, Zanzibar, Mozambique, Transvaal, Cape Colony.— Type locality: "Deutsch-Mozambique."

9. **Belonogaster dubius** F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 323, 329, and 335; Pl. xv, fig. 80; Pl. xvi, fig. 100; Pl. xvii, fig. 145 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 219, 235, and 263 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 161. E. Roubaud, C. R. Ac. Sc. Paris, CLI, 1910, pp. 553–556 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 110–139 (ethology). A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 338.

Belonogaster sævus var. H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 92, in footnote (♀).

Belonogaster massaicus P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 171 (♀). Synonym according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Casamance, Sierra Leone, Portuguese Guinea, Côte d'Ivoire, Fernando Po, Cameroon, French Congo, Portuguese Congo, Belgian Congo, Uganda, British and German East Africa, Zanzibar, Mozambique, Natal.— Type locality: "Dar es Salaam."

10. **Belonogaster eumenoides** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 94; Pl. xvii, fig. 12 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 209. Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 234, and 263; Pl. iv, fig. 6 (♀ ♂) (ethology). F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335.

Belonogaster pomicolor H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 209 (♀ ♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 80.

Belonogaster ornatus H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 209 (♀ ♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 80.

Madagascar, Nossi Bé.— Type locality: "Andrangoloaka."

11. **Belonogaster facialis** R. du Buysson, Bull. Soc. ent. France, 1908, p. 65 (♀); Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215 and 238 (♀); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 161.

Belonogaster sex-maculatus P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 174 (♂). Synonym according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Senegal, Congo, East Africa, Zanzibar.— Type locality: "Sénégal."

12. **Belonogaster filiformis** (H. de Saussure) F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 217, and 257 (♀).

Raphigaster filiformis H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 18; Pl. ii, fig. 4 (♀).

Southern Arabia.— Type locality: " Djidda."

Perhaps a variety of *B. griseus* (Fabricius).

13. **Belonogaster filiventris** (H. de Saussure) F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 47 and 68. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 218, 241, and 264; Pl. iv, fig. 1; Pl. vi, fig. 3 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 162.

Raphigaster filiventris H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 16; Pl. ii, fig. 5 (♀).

Belonogaster braunsii F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 323, 331, and 334 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80.

Belonogaster kohli W. A. Schulz, Spolia Hymenopterologica, 1906, p. 322 (♀).

Belonogaster gracilis P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 173 (♀). Synonym according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Sierra Leone, Togo, Cameroon, Fernando Po, French Congo, Belgian Congo, German and British East Africa, Mozambique, Nyasaland, Transvaal, Natal.— Type locality: H. de Saussure (1853) gives: "le Sénégal." The type specimen is labeled " Cayenne," according to R. du Buysson (1909).

14. **Belonogaster freyi** R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217 and 255 (♀).

South Africa.— Type locality: " Afrique australe."

15. **Belonogaster griseus** (Fabricius) F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. Dalla Torre, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. Radoszkowsky, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 37. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 47. A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64; Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lf. 10, 1912, p. 291; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 339; Deutsche entom. Zeitschr., 1914, p. 288. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 218, 247, and 264; Pl. ii, figs. 11–12; Pl. iv, fig. 8; Pl. v, fig. 3 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 162. P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 155. E. Roubaud, C. R. Ac. Sc. Paris, CLI, 1910, pp. 553–556 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 110–139 (ethology).

Vespa grisea Fabricius, Syst. Entom., 1775, p. 372; Mantis. Ins., I, 1787, p. 293. Olivier, Encycl. méthod. Ins., VI, 1791, p. 672.

Vespa macilenta Fabricius, Species Insect., I, 1781, p. 468; Mantis. Ins., I, 1787, p. 293. Olivier, Encycl. méthod. Ins., VI, 1791, p. 673.

Belonogaster macilentus F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94.

Vespa linearis Olivier, Encycl. méthod. Ins., VI, 1791, p. 673.

Belonogaster linearis F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 336. Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80.

Raphigaster rufipennis H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 15; Pl. ii, fig. 6 (♀).

Belonogaster rufipennis F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 93. Radoszkowsky, Hor. Soc. ent. Rossicæ, XII, 2, 1876, p. 141; Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. Fox, Ent. News, II, 1891, p. 42. A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 28. W. L. Distant, A Naturalist in the Transvaal, 1892, p. 210. Gribodo, Mem. Ac. Sc. Bologna, (5), IV, 1894, Sc. nat., p. 57. R. du Buysson, Ann. Soc. ent. France, LXVI, 2–3, 1898, p. 362. (*nec Sphex rufipennis* de Geer).

Belonogaster pictus F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 320, 323, 324, and 337; Pl. xvi, fig. 118; Pl. xvii, figs. 142, 146, 152, and 156 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. Tullgren, Ark. f. Zool., I, 1904, p. 454. P. Cameron, Trans. South African Philos. Soc., XVI, pt. 4, 1906, p. 327. W. A. Schulz, Spolia Hymenopterologica, 1906, p. 321. F. Maidl, Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Heft 4, 1913, Abt. 1, p. 560. E. Zavattari, Il Ruwenzori, Parte Scientif., I, Zool., 1909, p. 211.[1]

Belonogaster erythrospilus P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 172 (♀ ♂). Synonym according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Belonogaster fulvipennis H. de Saussure (misprint for *rufipennis*), in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 87 in footnote, and 90. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335.

Widely distributed throughout the Ethiopian part of the African continent, from the Cape Verde and Senegal to the Cape Colony; in Mt. Ruwenzori and Mt. Kilimanjaro up to 1500 m.— Type locality: " Sierra Leon, Africæ."

15*a*. var. **fuscipennis** R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 251 and 264 (♀ ♂) (ethology).

Cameroon, French Congo, Mozambique, Transvaal, German and British East Africa.— Type locality: " Haute Sanga."

15*b*. var. **menelikii** (Gribodo) R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 250 and 265; Pl. vii, fig. 1 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or. Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 163.

Belonogaster menelikii Gribodo, Ann. Mus. civ. Genova, (1), XIV, 1879, p. 342 (♀); XVI, 1881, p. 288 (♀ ♂); XX, 1884, p. 384 (♀); XXI, 1884, p. 288 (♀ ♂). F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 320, 323, and 337; Pl. xv, figs. 81 and 92; Pl. xvii, fig. 135 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. W. A. Schulz, Zoolog. Ann. Würzburg, IV, 1911, p. 200.

Throughout the eastern part of the African continent from Abyssinia to Natal; occurs also in Southern Arabia.— Type locality: " Mahal-Uonz," Scioa.

15*c*. var. **pallens** R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 250, and 265 (♀ ♂) (ethology).

Widely distributed in West and East Africa.— Type locality: " Dakar."

16. **Belonogaster guerini** (H. de Saussure) F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 91 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt

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[1] H. de Saussure quotes in his synopsis of the Malagasy species of *Belonogaster*, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 207, a *B. pictus* which was apparently never described, but is very different from *B. pictus* Kohl.

a. M., XXVI, 2, 1900, pp. 207 and 208. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269; Reise Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 63. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 225; Pl. v, figs. 8–14 (♀ ♂) (ethology).

Raphigaster guerini H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 17; Pl. II, fig. 3 (♀).

Madagascar, Comoro Islands, (Pemba Island, Delagoa Bay?) (Abyssinia and Natal, according to de Saussure; Sierra Leone, according to Smith).— Type locality: " Madagascar."

17. **Belonogaster hildebrandti** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 95; Pl. XVII, fig. 11 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 210. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 232; Pl. IV, fig. 5; Pl. v, figs. 5 and 7 (♀ ♂) (ethology).

Madagascar.— Type locality: " Madagascar, région centrale."

18. **Belonogaster indicus** (H. DE SAUSSURE) F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 87. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80. C. T. BINGHAM, Fauna Brit. India, Hym., I, 1897, p. 382, fig. 114 (♀ ♂). R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 258 (♀).

Raphigaster indicus H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 17 (♀).

British India (H. de Saussure, F. Smith, Bingham); Judaea, Japan (according to R. du Buysson); South Africa (H. de Saussure).— Type locality: " Judée," according to R. du Buysson; " Les Indes Orientales, Bombay," according to H. de Saussure.

18*a*. var. **claripennis** R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 219, and 259, Pl. IV, fig. 9 (♀ ♂).

Uganda, German East Africa.— Type locality: " Kigonsera."

19. **Belonogaster junceus** (FABRICIUS) F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 93. GERSTÆCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 468; Arch. f. Naturg., XXXVII, 1, 1871, p. 351; in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 324. C. RITSEMA, Tijdschr. v. Entom., XVII, 1874, pp. 201 and 210. WALKER, List Hym. Egypt, 1871, p. 39. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 599 (ethology); (2), XIX, 1898, p. 36. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 289; Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 88. A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 28. F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 186; Ann. naturh. Hofmus. Wien, IX, 1894, p. 336. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80; Pl. v, fig. 6. A. v. SCHULTHESS, Entom. Nachr., XIX, 1893, p. 18; Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lf. 10, 1912, p. 291; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 337; Soc. entomol., XXVII, 1912, p. 41; Ark. f. Zool., VIII, No. 17, 1913, p. 14; Deutsche entom. Zeitschr., 1914, p. 288. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48; Trans. Zool. Soc. London, XIX, 1909, 2, p. 181. R. DU BUYSSON, in A. Chevalier, L'Afrique centrale française, 1908, p.

707; Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 213, 220, and 263; Pl. II, figs. 1–7; Pl. III, figs. 1–7; Pl. IV, figs. 3 and 12–13; Pl. V, fig. 4; Pl. VII, fig. 2 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 160. P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 156; Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 171. W. A. Schulz, Zoolog. Ann. Würzburg, IV, 1911, p. 200. A. Tullgren, Ark. f. Zool., I, 1904, p. 453 (ethology). F. Maidl, Sitz. ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Abt. I, Heft 4, 1913, p. 560. E. Roubaud, C. R. Ac. Sc. Paris, CLI, 1910, pp. 553–556 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 110–139 (ethology).

Vespa juncea Fabricius, Spec. Insect., I, 1781, p. 468; Mantis. Ins., I, 1787, p. 293. Olivier, Encycl. méthod. Ins., VI, 1791, p. 673.

Raphigaster junceus H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 14 (♀ ♂), with the exception of the figure.

Vespa cinerea Fabricius, Entom. System., II, 1793, p. 277.

Belonogaster colonialis F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 320, 323, and 335; Pl. XV, figs. 72 and 84; Pl. XVII, figs. 132 and 139 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. C. T. Bingham, Trans. Zool. Soc. London, XIX, pt. 2, 1909, p. 181. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. E. Zavattari, Il Ruwenzori, Parte Scientif., I, Zool., 1909, p. 210.

Raphigaster guineensis F. Smith, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 129 (ethology).

Throughout the Ethiopian part of the African continent, from 20° lat. N. to Delagoa Bay and Natal; in Mt. Ruwenzori up to 2000 m.— Type locality: "in Africa æquinoctiali."

20. **Belonogaster lateritius** Gerstæcker, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 468; Pl. XXX, fig. 7. F. Kohl, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 186; Ann. naturh. Hofmus. Wien, IX, 1894, p. 336. Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 218, 256, and 264 (♀ ♂) (ethology); Résultats scientif. Voy. Afrique d'Ed. Foá, 1908, p. 593.

Eritrea, German East Africa, Mozambique, Angola, Damaraland, Transvaal, Natal, Caffraria, Belgian Congo.— Type locality: "Mossambique."

20*a*. var. **agilis** (F. Kohl) R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 257.

Belonogaster agilis F. Kohl, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 187, footnote; Pl., figs. 1, 4, and 9–10 (♀ ♂); Ann. naturh. Hofmus. Wien, IX, 1894, pp. 321, 323, 327, and 334; Pl. XV, fig. 73; Pl. XVI, figs. 96 and 115; Pl. XVII, figs. 134, 151, and 155 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80.

Belonogaster fleckii F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 332, and 335 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80.

Angola, Damaraland.— Type locality: "Angola."

20*b*. var. **elegans** (Gerstæcker) R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 257 and 264.

Belonogaster elegans Gerstæcker, Monatsb. k. Ak. Wiss. Berlin, 1857, p. 463 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 469; Pl. xxx, fig. 8. F. Kohl, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 187; Ann. naturh. Hofmus. Wien, IX, 1894, pp. 321, 323, and 335; Pl. xv, fig. 76; Pl. xvii, figs. 128 and 131 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 88. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269. E. Zavattari, Il Ruwenzori, Parte Scientif., I, Zool., 1909, p. 211.

Mozambique, Delagoa Bay, German East Africa.— Type locality: " Inhambane."

21. **Belonogaster leonhardii** R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217 and 252 (♀).

Uganda.— Type locality: " Iraouer."

22. **Belonogaster longistylus** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 97; Pl. xvii, fig. 13 (♀); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 207. Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 336. A. v. Schulthess, Reise Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 231 (♀).

Madagascar.— Type locality: " Madagascar."

23. **Belonogaster madecassus** (H. de Saussure) F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, 1890, pp. 89 and 98; Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 211. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 261.

Raphigaster madecassus H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 16; Pl. ii, fig. 7 (♀).

Madagascar.— Type locality: " Madagascar."

24. **Belonogaster malagassus** H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 210 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 230 (♀).

Madagascar, Nossi Bé.— Type locality: " Madagascar."

25. **Belonogaster petiolatus** (de Geer) F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. A. Tullgren, Ark. f. Zool., I, 1904, p. 461. W. A. Schulz, Berlin. entom. Zeitschr., LVII, 1912, p. 62.

Vespa petiolata de Geer, Mém. Hist. Insectes, VII, 1778, p. 610; Pl. xlv, fig. 10.

Belonogaster brachycerus F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 323, 324, and 331; Pl. xv, fig. 82; Pl. xvii, fig. 138 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 218, 254, and 264 (♀ ♂) (ethology).

Transvaal, Griqualand, Bechuanaland, German Southwest Africa, Basutoland, Cape Colony, Natal.— Type locality: " Cap de Bonne-Espérance."

26. **Belonogaster prasinus** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 92; Pl. xix. fig. 5 (♀ ♂); Abh. Sencken-

berg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 207. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. A. v. Schulthess, Reise Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 63. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 228 (♀ ♂).

Madagascar, Nossi Bé.— Type locality: " forêts à l'est de l'Antsihanaka."

26*a*. var. **bicolor** (H. de Saussure R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 229 (♀).

Belonogaster bicolor H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 208. Dalla Torre, Gen. Ins. Vesp., 1904, p. 80.

Madagascar.— Type locality: " Madagascar."

27. **Belonogaster pusillus** F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 320, 323, 325, and 337; Pl. xv, figs. 75 and 77; Pl. xvi, fig. 116; Pl. xvii, figs. 137, 140, 143, and 148 (♀ ♂). Dalla Torre, Cat. IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 218, 239, and 264; Pl. iv, fig. 2 (♀ ♂) (ethology); Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 161. A Tullgren, Ark. f. Zool., I, 1904, p. 454.

Sierra Leone, Togo, Portuguese Guinea, Belgian Congo, British and German East Africa.— Type locality: " Sierra Leone."

28. **Belonogaster rothkirchi** A. v. Schulthess, Soc. entomol. XXIX, 1914, p. 4 (♂); Deutsche entom. Zeitschr., 1914, p. 288, fig. (♂).

Cameroon.— Type locality: " Kamerunberg, Soppo, 730 m."

29. **Belonogaster sævus** H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 92, footnote (♀). F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 219, 242, and 264; Pl. iv, figs. 10 and 11 (♀ ♂). A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lf. 10, 1912, p. 291; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 338.

Belenogaster occidentalis A. Tullgren, Ark. f. Zool., I, 1904, p. 455; Pl. xxv, fig. 14 (♀ ♂).

Sierra Leone, Grand Bassam, Togo, Cameroon, Spanish Guinea, French and Belgian Congo, Uganda, Somaliland, German East Africa, Transvaal, Natal.— Type locality unknown.

30. **Belonogaster saussurei** W. F. Kirby, Proc. Zool. Soc. London, 1881, p. 649 (♀ ♂); 1898, p. 386; Nat. Hist. of Sokotra by H. D. Forbes, Zool. Hym., 1903, p. 248; Pl. xvi, fig. 2 (♀ ♂) (ethology). F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337; Denkschr. k. Ak. Wiss. Wien, math. naturh. Kl., LXXI, 1, 1907, p. 223; Pl. v, figs. 18, 20, and 31 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 262.

Belonogaster tricolor O. Taschenberg, Zeitschr. f. ges. Naturw. Halle, LVI, 1883, p. 175 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. R. du Buysson, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 261.

Socotra Island, Southern Arabia.— Type locality: " Sokotra, Hadibu Plain."

31. **Belonogaster tarsatus** F. Kohl, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 187; Pl., figs. 2, 5, 8, 12, and 16 (♀ ♂); Ann. naturh. Hofmus.

Wien, IX, 1894, pp. 321, 323, 333, and 337; Pl. XV, figs. 85 and 86; Pl. XVI, figs. 97 and 119; Pl. XVII, figs. 150, 153, and 154 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 219, 237, and 263; Pl. IV, fig. 7 (♀ ♂).

German East Africa, Zanzibar.— Type locality: " Mbusini (Usegua)."

32. **Belonogaster tessmanni** A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 45 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 339 (♀ ♂).

Spanish Guinea.— Type locality: "Spanisch Guinea, Uelleborg, Benitogebiet."

33. **Belonogaster turbulentus** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 323, 330, and 337; Pl. XV, fig. 87; Pl. XVI, fig. 101; Pl. XVII, fig. 147 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 216, 240, and 264; Pl. II, fig. 13 (♀). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 338. A. TULLGREN, Ark. f. Zool., I, 1904, p. 454.

Sierra Leone, Spanish Guinea, Cameroon, Belgian Congo.— Type locality: " Sierra Leone."

34. **Belonogaster turgidus** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 333, and 337; Pl. XV, fig. 74; Pl. XVI, fig. 114 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 260 (♀).

Fernando Po.— Type locality: " Fernando Po."

35. **Belonogaster vassei** R. DU BUYSSON, Bull. Soc. ent. France, 1906, p. 189 (♀); Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 213, 219, and 263; Pl. II, fig. 8 (♀) (ethology); Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 160 (♂). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 337; Soc. entomol., XXVII, 1912, p. 41.

Spanish Guinea, French Congo, Belgian Congo, British and German East Africa, Nyasaland, Zambesi, Tanganyika.— Type locality: " bassin inférieur du Zambèze, de la vallée de la Muza, à une altitude de 1000 à 1200 m."

26. Polybioides R. DU BUYSSON

Bull. Soc. ent. France, 1913, p. 299.

Genotype: *Vespa tabida* Fabricius, 1781.

1. **Polybioides melaina** (G. MEADE WALDO).

Polybia melaina G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VII, 1911, p. 110 (♀ ♂). A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lf. 10, 1912, p. 292.

Parapolybia tabida var. *melaina* A. v. SCHULTHESS, Mitt. Schweiz. ent. Ges., XII, Heft. 4, 1913, p. 163 (♀); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341.

Polybioides tabida var. *melaina* R. DU BUYSSON, Voy. Alluaud et Jeannel, Afr. or., Res. sc., Ins. Hym., III, Vesp., 1914, p. 164.

Central part of equatorial Africa: Uganda, Rugege, Mt. Kenia, Mt. Ruwenzori, and towards the west in the Belgian Congo, as far as Stanleyville and Uele; up to 1800 m. in the mountains.— Type locality: " between Salt Lake and Wawamba, near Mount Ruwenzori."

2. **Polybioides tabida** (Fabricius) R. du Buysson, Bull. Soc. ent. France, 1913, p. 299 (♀); Voy. Alluaud et Jeannel, Afr. or., Rés. sc., Ins. Hym., III, Vesp., 1914, p. 163.

Vespa tabida Fabricius, Spec. Insect., I, 1781, p. 468; Mantis. Ins., I, 1787, p. 293.

Polybia tabida H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 209; Pl. xxvi, fig. 4 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 133. Dalla Torre, Cat., IX, Vesp., 1894, p. 166; Gen. Ins. Vesp., 1904, p. 78. A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341; Deutsche entom. Zeitschr., 1914, p. 290. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. A. Tullgren, Ark. f. Zool., I, 1904, p. 456. W. A. Schulz, Spolia Hymenopterologica, 1906, p. 323; Berliner ent. Zeitschr., LVII, 1912, p. 85.

Parapolybia tabida A. v. Schulthess, Mitt. Schweiz. ent. Ges., XII, Heft 4, 1913, p. 162; Pl. xi, fig. 6; Pl. xi*B*, fig. 11 (♀).

Polybia bucula R. du Buysson, Bull. Soc. ent. France, 1902, p. 253 (♀) (ethology).

The typical form has a wide distribution in West Africa: Cameroon, Fernando Po, Assinia, French Congo, Belgian Congo.— Type locality: "in Africa æquinoctiali."

2*a*. var. **isabellina** (A. v. Schulthess).

Parapolybia tabida var. *isabellina* A. v. Schulthess, Mitt. Schweiz. ent. Ges., XII, Heft 4, 1913, p. 163 (♀); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341.

West Africa: Gold Coast, Spanish Guinea, Cameroon.— Type locality: not given.

ROPALIDIINÆ

27. **Ropalidia** Guérin Meneville

In Duperrey, Voyage de la Coquille, Zoologie, Atlas, Insectes, Pl. ix, fig. 8, 1831.

Rhopalidia Guérin Meneville, in Duperrey, Voyage de la Coquille, Zoologie, II, 2^{e} partie, 1ère division, 1838, p. 266. (*nec Rhopalidia* Lepeletier, Hist. nat. Ins. Hym., I, 1836, p. 538).

Icaria H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 22.

Genotype: *Ropalidia maculiventris* Guérin, 1831.

1. **Ropalidia æthiopica** (R. du Buysson).

Icaria œthiopica R. du Buysson, Rev. d'Ent. Caen, XXV, 1906, p. 110 (♀ ♂).

Abyssinia.— Type locality: "Dirouhoria."

?**Ropalidia africana** (P. Cameron).

Icaria africana P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 170 (♀).

East Africa.— Type locality: "Kilimandjaro, Kibonoto, 1000–1200 m."

According to G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53, a synonym of *R. distigma* (Gerstæcker); according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 13, of *R. cincta* (Lepeletier). This species is very doubtful.

2. **Ropalidia ambigua** (Gribodo).

Icaria ambigua Gribodo, Mem. Ac. Sc. Bologna, (5), IV, 1894, Sc. nat., p. 58 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 73. R. du Buysson, Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 155 (ethology).

Cape Colony, Transvaal, Mozambique, German East Africa, Gaboon.— Type locality: "fiume Magnarra, Mozambico."

Probably a synonym of *R. capensis* (Saussure).

3. **Ropalidia anarchica** (H. DE SAUSSURE).

Icaria anarchica H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 34; Pl. v, fig. 4 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 121 (♀); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 214. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 73. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110.

Southern Arabia, Madagascar.— Type locality: "Madagascar."

4. **Ropalidia antennata** (H. DE SAUSSURE).

Icaria antennata H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 136, footnote (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270.

Mozambique.— Type locality: "côte de Mozambique."

5. **Ropalidia atra** (H. DE SAUSSURE).

Icaria atra H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 119 (♀); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 215. DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 73.

Madagascar.— Type locality: "Sud-est de Madagascar."

6. **Ropalidia bicincta** (H. DE SAUSSURE).

Icaria bicincta H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 136; Pl. IV, figs. 3 and 3*b*; Pl. XVIII, fig. 20; Pl. XXII, fig. 2 (♀) (ethology); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 232 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 73.

Madagascar, Nossi Bé.— Type locality: "Madagascar."

7. **Ropalidia brazzai** (R. DU BUYSSON).

Icaria brazzai R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 110 (♀).

French Congo.— Type locality: "Congo, Lékéti."

Probably a synonym of *R. guttatipennis* (Saussure).

8. **Ropalidia capensis** (H. DE SAUSSURE).

Icaria capensis H. DE SAUSSURE, Entom. Zeitg. Stettin, XXIII, 1862, p. 139 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. P. CAMERON, Trans. South African Philos. Soc., XV, 4, 1905, p. 230 (♂); Ann. Transvaal Mus., II, 3, 1910, p. 155.

Cape Colony, Transvaal, Belgian Congo.— Type locality: "le Cap de Bonne-Espérance."

R. ambigua (Gerstæcker) is probably a synonym of this.

9. **Ropalidia carinata** (H. DE SAUSSURE).

Icaria carinata H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 122 (♀ ♂); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215 and 222 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64.

Madagascar.— Type locality: "Madagascar."

? **Ropalidia cariniscutis** (P. CAMERON).

Icaria cariniscutis P. CAMERON, Wiss. Ergebn. Schwed. Zool., Exp. Kilimandjaro, II, 8, 6, 1910, pp. 170 and 171 (♀).

East Africa.— Type locality: " Usambara: Mombo."

According to G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53, a synonym of *R. distigma* (Gerstæcker); according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 13, the female is *R. cincta* (Lepeletier), but the male belongs to another species; the latter sex, however, was not described by Cameron.

10. **Ropalidia cincta** (Lepeletier).

Epipona cincta Lepeletier, Hist. nat. Ins. Hym., I, 1836, p. 541 (♀).

Icaria cincta H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 39; Pl. v, fig. 9 (♀ ♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 234 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 97. A. Gerstæcker, Arch. f. Naturg., XXXVII, 2, 1871, p. 351; in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 324. Walker, List Hym. Egypt, 1871, p. 40. A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 28. Dalla Torre, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33. Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 35. Morice, Res. Swed. Zool. Exp. Jägerskiöld, pt. I, Hym. ac., 1904, p. 6. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48; Trans. Zool. Soc. London, XIX, 2, 1909, p. 182. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269; Wiss. Ergebn. D. Z. Afr. Exp., (1907–08), IV, Lf. 10, 1912, p. 291; Deutsche entom. Zeitschr., 1914, p. 290. E. Zavattari, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 548, 1907, p. 2. P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 155. R. du Buysson, Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 156. E. Roubaud, Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 140, fig. 32 (ethology).

Icaria tricinctella Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, Sc. nat., 1895, p. 87 (♀ ♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 74. Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 595.

Icaria xanthura Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 606 [*nec Icaria xanthura* H. de Saussure; see Gribodo, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 87].

Casamance, Gambia, Belgian Congo, Upper Nile, Abyssinia, Somaliland, British and German East Africa, Mozambique, Transvaal, Southern Arabia. On Mt. Ruwenzori as high as 2000 m.— Type locality: " Sénégal."

11. **Ropalidia clavata** (H. de Saussure).

Icaria clavata H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 40 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 97. Dalla Torre, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 48 and 68.

Cape Colony, Natal, Transvaal.— Type locality: " le Cap de Bonne-Espérance.

12. **Ropalidia constitutionalis** (H. de Saussure).

Icaria constitutionalis H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 30; Pl. iv, fig. 4 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 128 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 222 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 95. Dalla Torre, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73; Pl. v, figs. 3*a* and 3*b*.

Madagascar.— Type locality: " Madagascar."

13. **Ropalidia democratica** (H. de Saussure).

Icaria democratica H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 33 (♀);

in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 115 and 142 (♀♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. ED. ANDRÉ, Le Naturaliste, 1889, p. 189 (ethology). DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73.

Madagascar.— Type locality: "Madagascar."

14. **Ropalidia distigma** (GERSTÆCKER).

Icaria distigma GERSTÆCKER, Monatsber. k. Preuss. Ak. Wiss. Berlin, 1857, p. 464 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 471. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33. DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270. R. DU BUYSSON, Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 157.

British and German East Africa, Rhodesia, Mozambique, Transvaal, Natal.— Type locality: "Inhambane."

15. **Ropalidia dubia** (H. DE SAUSSURE).

Icaria dubia H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 33 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 115 and 141; Pl. XVIII, fig. 19 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216, 217, and 229 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65.

Madagascar.— Type locality: "Madagascar."

16. **Ropalidia ducalis** (H. DE SAUSSURE).

Icaria ducalis H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 226 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 73.

Madagascar.— Type locality: "Madagascar."

17. **Ropalidia fraterna** (H. DE SAUSSURE).

Icaria fraterna H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 225 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65.

Madagascar, Fundu Island (near Pemba Island).— Type locality: "Magagascar: Imerina."

18. **Ropalidia galimatia** (H. DE SAUSSURE).

Icaria galimatia H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 36 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73.

Icaria madecassa H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113, 114, and 125; Pl. XVIII, fig. 16 (♀♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 224 (♀). A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64.

Madagascar, Nossi Bé.— Type locality: "Madagascar."

18*a*. var. **ignobilis** (H. DE SAUSSURE).

Icaria ignobilis H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 127; Pl. IV, figs. 7 and 7*b* (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 224 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64.

Madagascar.— Type locality: " Madagascar."

19. **Ropalidia grandidieri** (H. de Saussure).

Icaria grandidieri H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 120; Pl. iv, figs. 5 and 5*b* (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215 and 221 (♀ ♂). Dalla Torre, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73. A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64.

Madagascar, Nossi Bé.— Type locality: " Madagascar."

20. **Ropalidia guttatipennis** (H. de Saussure).

Icaria guttatipennis H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 40; Pl. v, fig. 8 (♀). F. Smith, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 129 (ethology); Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 97. F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. Dalla Torre, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73. Magretti, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 35. Radoszkowsky, Jorn. Sc. math. phys. nat. Lisboa, VIII, No. 31, 1881, p. 204. Ed. André, Le Naturaliste, 1889, p. 189 (ethology). C. T. Bingham, Fauna of Brit. India, Hym., I, 1897, p. 387; Pl. iii, fig. 2 (♀ ♂). A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 66; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 340; Deutsche entom. Zeitschr., 1914, p. 290. R. du Buysson, Ann. Soc. ent. France, LXVI, 2–3, 1898, p. 361; Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 156. E. Roubaud, Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 141 (ethology).

Icaria politica H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 240 (♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 97. Dalla Torre, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Senegal, Grand Bassam, Gambia, Spanish Guinea, Cameroon, Belgian Congo, Gaboon, Angola, British and German East Africa, Transvaal, Natal, Somaliland, (British India).— Type locality: " le Sénégal."

21. **Ropalidia hova** (H. de Saussure).

Icaria hova H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 104, fig. A (ethology); pp. 113, 114, and 131; Pl. iv, figs. 2 and 2*b* (♀ ♀ ♂); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 228. Dalla Torre, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73.

Madagascar.— Type locality: " Madagascar."

21*a*. var. **minor** (H. de Saussure).

Icaria hova var. *minor* H. de Saussure, Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 217 (♀).

Madagascar.— Type locality: " Madagascar."

22. **Ropalidia interjecta** (H. de Saussure).

Icaria interjecta H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 225 (♀ ♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 73. A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65.

Madagascar, Nossi Bé.— Type locality: " Madagascar."

23. **Ropalidia irrequieta** (F. Kohl).

Icaria irrequieta F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 222; Pl. ii, figs. 1, 13, and 14 (♀).

Southern Arabia.— Type locality: " Ras Farták."

? **Ropalidia maculata** (Radoszkowsky).

Icaria maculata RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 204 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 74.

Angola.— Type locality: "Angola."

A very doubtful species.

? **Ropalidia nigrofemorata** (P. CAMERON).

Icaria nigrofemorata P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 170 (♀).

East Africa.— Type locality: "Usambara."

According to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 13, the type has lost its abdomen and can not be identified.

24. **Ropalidia nitidula** (H. DE SAUSSURE).

Icaria nitidula H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 122; Pl. XVIII, fig. 17 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 227 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: "Madagascar."

25. **Ropalidia nobilis** (GERSTÆCKER).

Icaria nobilis GERSTÆCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 464 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 470; Pl. XXX, fig. 9 (♀). H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 133, footnote (♀). F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 189. DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33.

Zanzibar, Mozambique, German East Africa.— Type locality: "Mossambique."

Probably a synonym of *R. guttatipennis* (Saussure).

26. **Ropalidia phalansterica** (H. DE SAUSSURE).

Icaria phalansterica H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 35; Pl. IV, fig. 5; Pl. V, fig. 1 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 115 and 140 (♀ ♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 232. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. ED. ANDRÉ, Le Naturaliste, 1889, p. 189 (ethology). DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65 (ethology).

Madagascar.— Type locality: "Madagascar."

27. **Ropalidia pomicolor** (H. DE SAUSSURE).

Icaria pomicolor H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 32; Pl. V, fig. 3 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 117; Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 214. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 95. DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: "Madagascar."

28. **Ropalidia prasina** (H. DE SAUSSURE).

Icaria prasina H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215, 216, and 220 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: "Madagascar: Imerina."

29. **Ropalidia pulchella** (H. DE SAUSSURE).

Icaria pulchella H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215 and 223, fig. 4 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 74.

Nossi Bé.— Type locality: " Nossi-Bé."

30. **Ropalidia ranavali** (H. de Saussure).

Icaria ranavali H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 138; Pl. xviii, figs. 18 and 18*c* (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 230. Dalla Torre, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: " Madagascar."

31. **Ropalidia regina** (H. de Saussure).

Icaria regina H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215 and 220 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: " Madagascar: Antannarivo."

32. **Ropalidia sakalava** (H. de Saussure).

Icaria sakalava H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 228 (♀). Dalla Torre, Gen. Ins. Vesp., 1904, p. 74. A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65 (♂).

Madagascar.— Type locality: " Madagascar: Antannarivo."

33. **Ropalidia schulthessi** (H. de Saussure).

Icaria schulthessi H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 117; Pl. xviii, figs. 14 and 14*b* (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 214. Dalla Torre, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: " l'est de Madagascar."

34. **Ropalidia scottiana** (H. de Saussure).

Icaria scottiana H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 124 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 214. Dalla Torre, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: " le ~~sud-est de~~ Madagascar."

35. **Ropalidia subclavata** (H. de Saussure).

Icaria subclavata H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113, 114, and 134; Pl. iv, figs. 6 and 6*b* (♀ ♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 232. Dalla Torre, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: " Madagascar."

36. **Ropalidia tomentosa** (Gerstæcker).

Icaria tomentosa Gerstæcker, Monatsb. k. Preuss. Ak. wiss. Berlin, 1857, p. 464 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 471; Pl. xxx, fig. 10 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 74. A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269. R. du Buysson, Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 156.

Mozambique, British East Africa.— Type locality: " Tette."

R. æthiopica (R. du Buysson) is probably a synonym of this.

37. **Ropalidia variabilis** (H. de Saussure).

Icaria variabilis H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 135; Pl. xviii, fig. 15 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 231. Dalla Torre, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: "Madagascar."

38. **Ropalidia velutina** (H. DE SAUSSURE).

Icaria velutina H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 129; Pl. IV, figs. 4 and 4*b* (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 227 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 75.

Madagascar.— Type locality: "Madagascar."

39. **Ropalidia venustula** (H. DE SAUSSURE).

Icaria venustula H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 231 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 75.

Madagascar.— Type locality: "Madagascar: Imerina."

40. **Ropalidia vitripennis** (H. DE SAUSSURE).

Icaria vitripennis H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113, 114, and 130 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 229 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 75.

Madagascar, Nossi Bé.— Type locality: "Madagascar."

41. **Ropalidia xanthura** (H. DE SAUSSURE).

Icaria xanthura H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 236 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 125 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 75.

Madagascar.— Type locality: "Madagascar."

POLISTINÆ

28. **Polistes** LATREILLE

Hist. nat. Crust. Ins., III, (an X), 1802, p. 363.

Genotype: *Vespa gallica* Linné, 1767.

1. **Polistes albocalcaratus** R. DU BUYSSON, Bull. Soc. ent. France, 1905, p. 257 (♀ ♂). A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 69.

Madagascar.— Type locality: "Ténérive."

2. **Polistes albicinctus** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 144 and 148; Pl. XVIII, fig. 21 (♀ ♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 234 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 122; Gen. Ins. Vesp., 1904, p. 68. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 68.

Madagascar.— Type locality: "Madagascar."

3. **Polistes aquilinus** R. DU BUYSSON, Bull. Soc. ent. France, 1905, p. 256 (♀). A. v. SCHULTHESS, Deutsche entom. Zeitschr., 1914, p. 290.

French Congo, Sierra Leone, Belgian Congo, Cameroon.— Type locality: "Ogooué."

4. **Polistes badius** A. GERSTÆCKER, Arch. f. Naturg., XXXVII, 1, 1871, p. 351 (♀); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 325; Pl. XIV, fig. 1. DALLA TORRE, Cat., IX, Vesp., 1894, p. 123; Gen. Ins. Vesp., 1904, p. 69. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34.

Zanzibar.— Type locality: "Wanga."

5. **Polistes bituberculatus** R. du Buysson, Bull. Soc. ent. France, 1905, p. 257 (♀ ♂). A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 69.

Madagascar.— Type locality: "région de Fort-Dauphin."

6. **Polistes defectivus** A. Gerstæcker, Arch. f. Naturg., XXXVII, 1, 1871, p. 351 (♀); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 326. Dalla Torre, Cat., IX, Vesp., 1894, p. 127; Gen. Ins. Vesp., 1904, p. 69. Gribodo, Mem. Ac. Sc. Bologna, (5), V, 1895, Sc. nat., p. 85 (♀ ♂). H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34.

German East Africa, Mozambique, Cape Colony.— Type locality: "Uru."

7. **Polistes ellenbergi** R. du Buysson, Bull. Soc. ent. France, 1908, p. 64 (♀). A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341.

Cameroon, Spanish Guinea, French Congo.— Type locality: "Talagouga, près de N'Jolé."

8. **Polistes fastidiosus** H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 60 (♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 104. Gerstæcker, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 470. Magretti, Ann. Mus. civ. Genova, XXI, 1884, p. 607. Dalla Torre, Cat., IX, Vesp., 1894, p. 127; Gen. Ins. Vesp., 1904, p. 69. Gribodo, Mem. Ac. Sc. Bologna, (5), V, 1895, Sc. nat., p. 86 (♀). A. v. Schulthess, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 49 and 68. R. du Buysson, Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 157.

Polistes sp.? F. Kohl, Jahrb. Hamburg. wiss. Anst. X, 2, (1892), 1893, p. 186.

Senegambia, Grand-Bassam, Upper Dahomey, Belgian Congo, German and British East Africa, Mozambique, Transvaal, Cape Colony.— Type locality: "la Sénégambie."

8*a*. var. **sikoræ** (H. de Saussure).

Polistes sikoræ H. de Saussure, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 233 (♀ ♂). Dalla Torre, Gen. Ins. Vesp., 1904, p. 71. A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, pp. 67 and 68 (♂).

Madagascar.— Type locality: "Madagascar."

9. **Polistes flavipennis** H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 52 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 104. Dalla Torre, Cat., IX, Vesp., 1894, p. 127; Gen. Ins. Vesp., 1904, p. 69.

Cape Colony.— Type locality: "le Cap de Bonne-Espérance."

10. **Polistes haugi** R. du Buysson, Bull. Soc. ent. France, 1906, p. 189 (♀ ♀ ♂); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 158. A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341.

Spanish Guinea, Gaboon, British East Africa, Belgian Congo.— Type locality: "N'gomo, dans le bas Ogooué."

11. **Polistes macaensis** (Fabricius) R. C. L. Perkins, Entom. Mo. Mag., (2), XII, 1901, p. 264 (♀ ♂). G. Meade Waldo, Trans. Linn. Soc. London, (2), XV, Zool., 1, 1912, p. 44 (♀ ♂).

Vespa macaensis Fabricius, Entom. Syst., II, 1793, p. 259.

Polistes hebræus H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 143, fig. D, and p. 144 (ethology). Gerstæcker, in v. d. Decken's

Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 324. J. Pérez, Ann. Soc. ent. France, LXIV, 1895, p. 206. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34. A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, pp. 67 and 68. P. Cameron, Trans. Linn. Soc. London, (2), XII, Zool., 1, 1907, p. 71. *F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXXI, 1908, p. 312; Pl. iii, figs. 2, 10, and 11 (♂). (*nec Vespa hebræa* Fabricius, 1787).

South Africa (?), Madagascar, Nossi Bé, Mauritius, Réunion, Seychelles Islands, Chagos Islands, Amirantes Islands, Zanzibar, (Oriental region to the Islands of the Pacific); (Arabia, Egypt?).— Type locality: "in Macao Indiæ."

Perkins, *loc. cit.*, has first pointed out the characters separating *P. macaensis* (Fabricius) from *P. hebræus* (Fabricius); the occurrence of the latter species in the Malagasy subregion or on the African continent is very doubtful. G. Meade Waldo (1912) has furthermore shown that *P. macaensis* (Fabricius) is the lighter colored species; whereas the darker colored, with very short and pointed spines on the seventh tergite in the male, is the true *P. hebræus* (Fabricius) = *P. perkinsii* Kohl, 1908. I have seen specimens of *P. macaensis* (Fabricius) from Zanzibar and Mauritius.

12. **Polistes macrocephalus** J. Bequaert. See p. 261 (♀).

Belgian Congo.— Type locality: Walikale.

*13. **Polistes maculipennis** H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 61; Pl. vi, fig. 4 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 131; Gen. Ins. Vesp., 1904, p. 70. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48. P. Cameron, Ann. Transvaal Mus., II, 3, 1910, p. 155.

Transvaal, Nyasaland, Cape Colony.— Type locality: "Java et l'Afrique méridionale."

14. **Polistes madecassus** H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 51 (♀ ♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 144; Pl. iv, fig. 8 (♀). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 105. Dalla Torre, Cat., IX, Vesp., 1894, p. 131; Gen. Ins. Vesp., 1904, p. 70. A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, pp. 66 and 68, figs. 1–3 (♂).

Madagascar.— Type locality: " Madagascar."

15. **Polistes marginalis** Fabricius, Syst. Piez., 1804, p. 272. H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 62; Pl. vi, fig. 2 (♀ ♀ ♂). F. Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 105. Gerstæcker, in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 325; Arch. f. Naturg., XXXVII, 1, 1871, p. 351. Walker, List Hym. Egypt, 1871, p. 40. Gribodo, Ann. Mus. civ. Genova, XVI, 1881, p. 238; XXI, 1884, p. 286; Mem. Ac. Sc. Bologna, (5), IV, 1894, Sc. nat., p. 60; (5), V, 1895, Sc. nat., p. 86. Dalla Torre, Cat., IX, Vesp., 1894, p. 131; Gen. Ins. Vesp., 1904, p. 70. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. H. Stadelmann, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34. C. T. Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48. A. v. Schulthess, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 68; Ark. f. Zool., VIII, No. 17, 1913, p. 13; Wiss. Ergebn. D. Z. Afrik. Exp., (1907–08), IV, Lf. 10, 1912, p. 291; Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270. R. du Buysson, Ann. Soc. ent. France, LXVI, 2–3, 1898, p. 362; in A. Chevalier, L'Afrique centrale française, 1908, p. 707; Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 159. P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 169;

Ann. Transvaal Mus., II, 3, 1910, p. 155. W. A. SCHULZ, Hymen. Studien, 1905, p. 15. Е. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 141–142 (ethology).

Vespa marginalis FABRICIUS, Syst. Entom., 1775, p. 367; Mantis. Ins., I, 1787, p. 289. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 685.

Polistes marginalis var. *stigma* MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 607.

Distributed throughout the Ethiopian part of the African continent, from 20° N. lat. to the Cape; also in Southern Arabia.— Type locality: " in Cap. b. S."

15*a*. var. **africanus** (PALISOT DE BEAUVOIS) A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 340. R. DU BUYSSON, Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 159.

Polistes africana PALISOT DE BEAUVOIS, Ins. recueillis en Afrique et Amérique, 1805, p. 207; Atlas, Hymén., Pl. VIII, fig. 4. W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 228.

Polistes ornatus LEPELETIER, Hist. nat. Ins. Hym., I, 1836, p. 531.

Polistes plebejus A. GERSTÆCKER, Arch. f. Naturg., XXXVII, 1, 1871, p. 351 (♀); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 325.

Polistes marginalis var. *plebejus* A. v. SCHULTHESS, Deutsche entom. Zeitschr., 1914, p. 290.

With the typical form, throughout the Ethiopian region.— Type locality: " Royaume d'Oware."

15*b*. var. **inornatus** (C. RITSEMA).

Polistes inornatus C. RITSEMA, Tijdschr. v. Ent., XVII, 1874, p. 203; Pl. XI, fig. 8 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 131; Gen. Ins. Vesp., 1904, p. 70. W. A. SCHULZ, Berliner ent. Zeitschr., LI, Heft 4, 1907, p. 314 (♀).

Belgian Congo (Banana).— Type locality: " Banana-Loango."

16. **Polistes rubidus** LEPELETIER, Hist. nat. Ins. Hym., I, 1836, p. 523 (♂). H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 50. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 104. DALLA TORRE, Cat., IX, Vesp., 1894, p. 133; Gen. Ins. Vesp., 1904, p. 71.

South Africa.— Type locality: " Cap de Bonne-Espérance."

This species is very doubtful and probably not Ethiopian.

17. **Polistes saussurei** DALLA TORRE, Cat., IX, Vesp., 1894, p. 134; Gen. Ins. Vesp., 1904, p. 71.

Polistes incertus H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 144 and 145; Pl. IV, fig. 9 (♀). A. v. SCHULTHESS, Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, pp. 67 and 68 (ethology). (*nec Polistes incertus* CRESSON, 1865).

Madagascar, Comoro Islands.— Type locality: " Madagascar."

18. **Polistes smithii** H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 60; Pl. VII, fig. 3 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 144 and 146 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 233 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 104. GERSTÆCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 470. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 287. A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 29. F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 186. DALLA TORRE, Cat., IX, Vesp., 1894, p. 134; Gen. Ins. Vesp., 1904, p. 71. P. MAGRETTI, Ann. Mus. civ. Genova, (2), XV, 1895, p. 169. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34. A. v. SCHULTHESS, Bull. Soc. Vaudoise

Sc. nat., (4), XXXV, 1899, p. 270; Reise in Ost-Afrika, (1903–05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 69; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 340; Ark. f. Zool., VIII, No. 17, 1913, p. 13. C. T. Bingham, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48; Trans. Zool. Soc. London, XIX, 2, 1909, p. 182. P. Cameron, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 169; Ann. Transvaal Mus., II, 3, 1910, p. 155. R. du Buysson, Voy. Alluaud et Jeannel Afr. or., Rés. sc., Ins. Hym., III, Vesp., 1914, p. 158.

Throughout the continental part of the Ethiopian region; on Mt. Ruwenzori as high as 1200 m.; on Mt. Kilimandjaro as high as 1900 m.; (Madagascar?).— Type locality: " la Sénégambie."

19. **Polistes spilophorus** A. Schletterer, Ann. Soc. ent. Belgique, XXXV, 1891, p. 29; Pl. i, fig. 12 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 134; Gen. Ins. Vesp., 1904, p. 71. W. A. Schulz, Spolia Hymenopterologica, 1906, p. 229.

Polistes spiloptera F. Kohl, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343.

Polistes tenellus R. du Buysson, Bull. Soc. ent. France, 1905, p. 256 (♀ ♂). A. v. Schulthess, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 340; Deutsche entom. Zeitschr., 1914, p. 290.

Cameroon, Spanish Guinea, Gaboon, French Congo, Belgian Congo.— Type locality: " Equateur-Congo."

20. **Polistes tristis** G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VII, 1911, p. 101 (♀).

British East Africa.— Type locality: " Mombasa."

21. **Polistes tullgreni** W. A. Schulz, Spolia Hymenopterologica, 1906, p. 229 (♀).

Polistes inornatus A. Tullgren, Ark. f. Zool., I, 1904, p. 456; Pl. xxv, figs. 15 *a–b* (♀). (*nec Polistes inornatus* Ritsema, 1874).

Cameroon.— Type locality: " the Cameroons."

VESPINÆ

29. **Vespa** LINNÉ

Syst. Nat. (ed. 1a, 1735); ed. 10a, I, 1758, pp. 343 and 572.

Genotype: *Vespa crabro* Linné, 1758.

1. **Vespa orientalis** Linné, Mantissa Plantarum, II, 1771, p. 540. H. de Saussure, Et. fam. Vesp., II, Vesp., 1853, p. 132; Pl. xiv, figs. 1 *a–d*. Walker, List Hym. Egypt, 1871, p. 40. Dalla Torre, Cat., IX, Vesp., 1894, p. 151; Gen. Ins. Vesp., 1904, p. 65. R. du Buysson, Ann. Soc. ent. France, LXXIII, (1904), 3, 1905, p. 507 (♀ ☿ ♂); Bull. Soc. ent. France, 1908, p. 133. F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 221; Pl. v, figs. 3, 7, and 25 (♀ ♂).

Eastern part of the Mediterranean region, Egypt, Southern Arabia, Northwestern India; was found in the Central Sahara and in Abyssinia; also on Madagascar, where it was probably accidentally introduced (see H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 149).— Type locality: "in Oriente."

1*a*. var. **ægyptiaca** Ed. André, Spéc. Hym. Eur. Algér. II., fasc. 21–23, 1884,

p. 584. R. du Buysson, Ann. Soc. ent. France, LXXIII, (1904), 3, 1905, p. 510 (♀ ♀ ♂).

Egypt, Arabia, Aden.— Type locality: " Le Caire."

2. **Vespa rubricans** J. Pérez, Actes Soc. Linn. Bordeaux, LXIV, 1910, p. 10 (♀).

German East Africa.— Type locality: " Lindi."

Doubtful Genus

Catilostenus Meunier

Il Naturalista Siciliano, VII, No. 6, 1888, p. 150.

1. **Catilostenus nigroviolaceus** Meunier, Il Naturalista Siciliano, VII, No. 6, 1888, p. 151 (♀). Dalla Torre, Cat., IX, Vesp., 1894, p. 112; Gen. Ins. Vesp., 1904, p. 87.

Belgian Congo.— Type locality: " Banana."

Probably a species of *Synagris*.

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Article II.—CONTRIBUTIONS TO THE HERPETOLOGY OF THE BELGIAN CONGO BASED ON THE COLLECTION OF THE AMERICAN MUSEUM CONGO EXPEDITION, 1909–1915[1]

PART I. TURTLES, CROCODILES, LIZARDS, AND CHAMELEONS

BY KARL PATTERSON SCHMIDT

WITH FIELD NOTES BY HERBERT LANG AND JAMES P. CHAPIN

PLATES VII TO XXXII, 22 MAPS, AND 27 TEXT FIGURES

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INTRODUCTION

The American Museum Congo Expedition, under the direction of Herbert Lang and James P. Chapin, returned from the Belgian Congo with an unusually large and well preserved collection of reptiles and batrachians, consisting of more than 4000 specimens. With 71 turtles, 13 crocodiles, and 1509 lizards, this is the largest collection, in number of specimens, ever brought from Africa by a single expedition.

These specimens are distributed among the following families:

TURTLES

		Number of specimens
Testudinidæ	1 genus, 2 species	49
Pelomedusidæ	2 genera, 3 species	22

CROCODILES

Crocodylidæ	2 genera (1 new), 3 species (1 new)	13

LIZARDS

		Number of specimens
Geckonidæ	3 genera, 10 species (3 new)	246
Agamidæ	1 genus, 2 species	147
Varanidæ	1 genus, 2 species	32
Lacertidæ	6 genera, 7 species (3 new)	195
Gerrhosauridæ	1 genus, 2 species	29
Scincidæ	3 genera, 12 species (1 new)	540
Anelytropidæ	1 genus, 1 species	6

CHAMELEONS

Chamæleontidæ	2 genera, 8 species (2 new)	314

All of the Central African families of lizards are represented, with the exception of the Amphisbænidæ. Ten of the fifty-two species are described as new. In addition to these, fifteen are rare forms, many for the first time collected in adequate series.

The chief value of the present paper must be credited to Messrs. Lang and Chapin. It is impossible adequately to express the admiration due these men for their field work. The field notes, the exact locality labels, and the remarkably fine condition of the specimens are the evidence of the highest degree of enthusiasm and efficiency. Through the courtesy of Dr. Wm. T. Hornaday, Director of The New York Zoological Society, we have been able to reproduce the photographs of *Crocodylus niloticus* Laurenti and *Osteolæmus tetraspis* Cope (Plates XII and XIII). All other photographs were taken in the field by Mr. H. Lang, and the figures on Plate XXXII have been selected from seventeen color sketches made from life by Mr. J. P. Chapin. The drawing of the head of *Algiroides alleni* (Text Figure 16) has been kindly contributed by Dr. Thomas Barbour. The other illustrations were made under the author's direction: Figs. 1, 6, 7, 12 to 15, 18 to 24, 27, and the two figures on Plate XV by Mr. M. Nishimura; the others by Mrs. Helen Ziska.

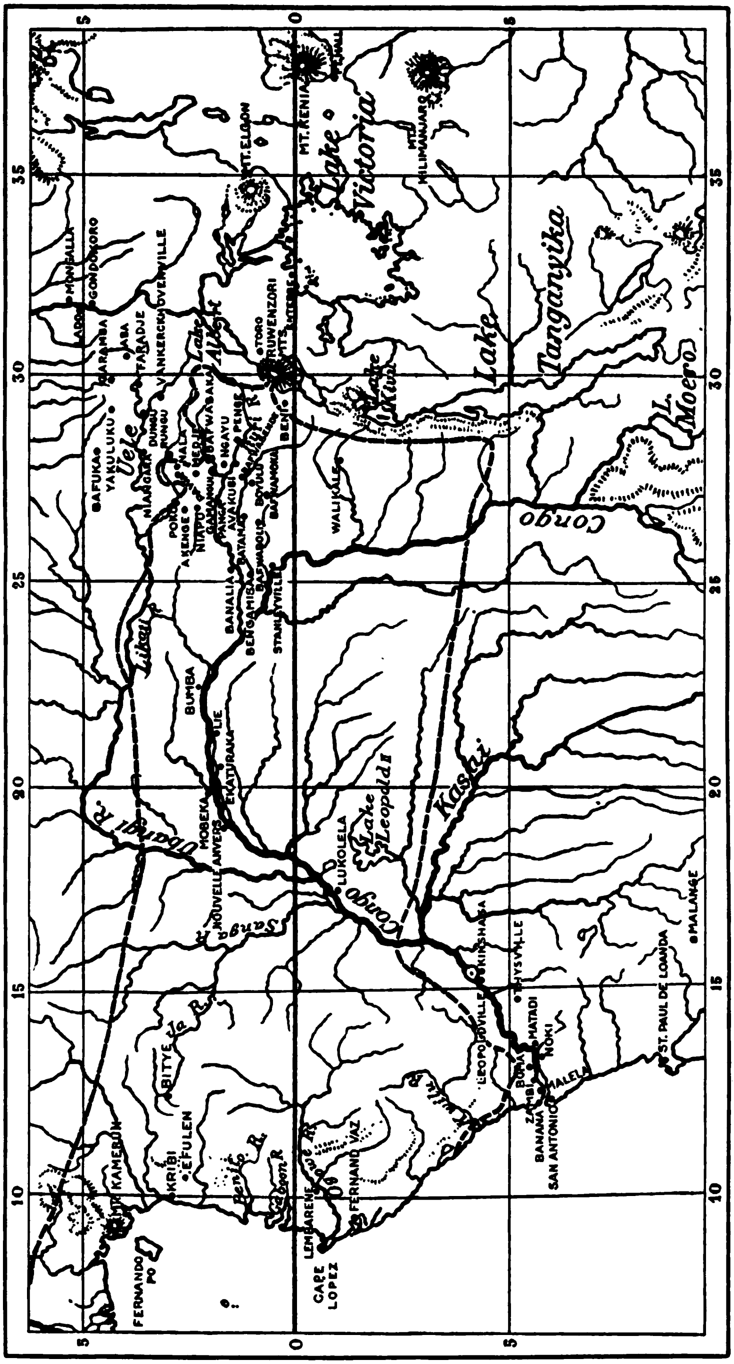
A large amount of bibliographical work has been necessary in the course of the present study. The literature for the turtles was brought down to 1909 by Siebenrock and the references here added complete the bibliographies of the species considered to 1916. No comprehensive work on African lizards has been done since 1887, the date of the last volume of Dr. Boulenger's Catalogue. In the hope of facilitating reference to the voluminous literature of African herpetology for other workers, the full bibliography examined has been quoted in most cases. Unfortunately, these bibliographies are in no sense complete. Many works and some periodicals have been inaccessible and, as attention has been directed chiefly to distributional and systematic papers, morphological works have not been included. Available records of localities of the species dealt with have been used in mapping the ranges. The deductions to be drawn from the data introduce a geographical element, showing a certain correlation between the distribution of these species and the great uniformity of the botanical regions (Map 2, p. 399), whose limits practically coincide with the large faunal areas. In the main, however, the acceptance of locality records from the literature without examination of specimens has of necessity been uncritical.

The systematic work was greatly handicapped by the lack of African material for comparison. The large series of most species in the present collection have accordingly been of the greatest value, the collection, to a degree, carrying its own "comparison material" with it. With the single exception of the small collections from East Africa at the Field Museum in Chicago, nearly all of the African material available in the United States which could in any way relate to the species of the present collection has been examined. The writer's thanks are due to the authorities of The Academy of Natural Sciences of Philadelphia and to Henry W. Fowler of that institution for the loan of West African specimens, including the types of species described by Edward Hallowell. Dr. A. G. Ruthven has loaned a small but interesting collection of lizards from Kamerun. Dr. Leonhard Stejneger, Curator of Herpetology at the United States National Museum, kindly permitted the writer to examine a part of the East African material of the Roosevelt Expedition. Dr. Thomas Barbour of the Harvard Museum of Comparative Zoology has furthered the present work with valuable advice and cooperation, as well as by giving the writer access to the fine collections of that museum.

Within The American Museum of Natural History, the cooperation of Messrs. Lang and Chapin, whose intimate knowledge of African conditions has been constantly available, has been cordial and invaluable. Dr. J. Bequaert has made many careful identifications of stomach contents, has assisted the writer in the technical details of the manuscript, and has supplied important suggestions, from his field knowledge of African botany, for the present studies of distribution. In the figures of *Varanus* and crocodile skulls the nomenclature in use by Dr. W. K. Gregory has been followed.

The field notes of the collectors are of unusual value because of their long stay in the Ituri region and their consequent familiarity with the environment. Ecological notes for many of the species are here presented for the first time.

Much of the material is available for morphological study, which has not been attempted in the present paper.



Map 1. The Central African region traversed by The American Museum Congo Expedition, showing the localities from which specimens are recorded in the present paper, as well as some others mentioned. The limits of the continuous Rain Forest are indicated, as in the succeeding maps of distribution, by a broken line.

LIST OF LOCALITIES FROM WHICH SPECIMENS ARE RECORDED, WITH THEIR APPROXIMATE LATITUDE AND LONGITUDE

Aba.— 3° 50′ N., 30° 10′ E.
Akenge.— 2° 55′ N., 26° 50′ E.
Avakubi.— 1° 20′ N., 27° 40′ E.
Bafuka.— 4° 20′ N., 27° 50′ E.
Bafwabaka.— 2° 10′ N., 27° 50′ E.
Bafwaboli.— 0° 40′ N., 26° 10′ E.
Bafwasende.— 1° 10′ N., 27° E.
Banalia.— 1° 30′ N., 25° 40′ E.
Banana.— 6° S., 12° 20′ E.
Batama.— 1° N., 26° 40′ E.
Bengamisa.— 1° N., 25° 10′ E.
Beni.— 0° 30′ N., 29° 30′ E.
Boma.— 5° 50′ S., 13° 10′ E.
Boyulu.— 1° N., 27° 30′ E.
Bumba.— 2° 10′ N., 22° 30′ E.
Dungu.— 3° 30′ N., 28° 30′ E.
Ekaturaka.— 2° N., 20° 30′ E.
Faradje.— 3° 40′ N., 29° 40′ E.
Gamangui.— 2° 10′ N., 27° 20′ E.
Garamba.— 4° 10′ N., 29° 40′ E.
Irebu.— 0° 35′ S., 17° 50′ E.
Kinshasa.— 4° 20′ S., 15° 20′ E.
Leopoldville.— 4° 25′ S., 15° 20′ E.
Lie.— 2° N., 21° 20′ E.
Lukolela.— 1° 10′ S., 17° 10′ E.
Malela.— 6° S., 12° 40′ E.
Matadi.— 5° 50′ S., 13° 35′ E.
Medje.— 2° 25′ N., 27° 30′ E.
Mobeka.— 2° N., 19° 50′ E.
Nala.— 2° 50′ N., 27° 50′ E.
Ngayu.— 1° 40′ N., 27° 40′ E.
Niangara.— 3° 40′ N., 27° 50′ E.
Niapu.— 2° 15′ N., 26° 50′ E.
Noki.— 5° 50′ S., 13° 30′ E.
Nouvelle Anvers.— 1° 40′ N., 19° 10′ E.
Panga.— 1° 45′ N., 26° 15′ E.
Pawa.— 2° 25′ N., 27° 50′ E.
Penge.— 1° 25′ N., 28° 15′ E.
Poko.— 3° 10′ N., 26° 50′ E.
Stanleyville.— 0° 30′ N., 25° 15′ E.
St. Antonio.— 6° 10′ S., 12° 20′ E.
St. Paul de Loanda.— 8° 55′ S., 13° 10′ E.
Vankerckhovenville.— 3° 20′ N., 29° 20′ E.
Walikale.— 1° 25′ S., 28° E.
Yakuluku.— 4° 20′ N., 28° 50′ E.
Zambi.— 6° S., 12° 50′ E.

NEW GENUS

Osteoblepharon. Type, *O. osborni,* new species .... p. 420

LIST OF NEW SPECIES AND SUBSPECIES, WITH THEIR TYPE LOCALITIES

Osteoblepharon osborni	Niapu	p. 421
Gonatodes dickersoni	Medje	p. 436
Hemidactylus ituriensis	Avakubi	p. 455
Lygodactylus depressus	Medje	p. 466
Lacerta langi	Medje	p. 492
Ichnotropis chapini	Aba	p. 508
Eremias nitida garambensis	Garamba	p. 511
Mabuya sudanensis	Garamba	p. 536
Chamæleon etiennei	Banana	p. 574
Chamæleon ituriensis	Medje	p. 589

PRELIMINARY NOTE ON THE DISTRIBUTION OF AFRICAN LIZARDS

Plates VII–X

It is hoped that a more exhaustive study of the distribution of African reptiles and batrachians may be undertaken on the completion of the systematic account of the collections of the Congo Expedition in these groups. The work on distribution for the present paper is chiefly a collection of data for such a future study, consisting of an examination of the distribution of individual species. This material is presented graphically by means of maps, which have been so constructed as to admit the interpolation of future locality records. This work is, accordingly, quite independent of the general conclusions reached and is placed in the body of the paper under the species in question. Certain of the general conclusions, however, appear sufficiently definite to warrant the preliminary account here included, though it is of necessity confined to the species of the present collection and is made without reference to the distribution of other groups.

To a student previously unfamiliar with the African fauna, the first characteristic of the distribution of African reptiles and batrachians that attracts attention is the enormous range of certain species in every group. *Bufo regularis*, *Crocodylus niloticus*, and *Varanus niloticus* are examples in point, ranging from Cairo to the Cape and from Senegambia to Somaliland, while many other species have a range only slightly less extensive. This feature of African distribution relates, of course, to the absence of physical barriers in Africa, none of the divides between river systems being an important factor in the distribution of land animals.

The second characteristic, which is the main thesis of the present discussion, is the vital influence of the plant distribution in determining that of African animals. Two climatic-botanical barriers have influenced distribution much as mountain ranges do on other continents — the barren Sahara Desert, which, itself little explored, is effective in isolating Barbary from the rest of Africa; and the dense and continuous tropical Rain Forest of the Congo Basin. Lines of equal rainfall, evidently, and not isotherms, are the chief climatic factors in African distribution.

Attention is drawn to the plates illustrating these various zones. Four photographs illustrate the typical aspect of the two principal zones, the Rain Forest and the Savannah Region. Plate VIII presents the characteristics of the moist Ituri Forest and Plate VII of its extension into the Uele watershed, while the open and dry savannah of the northeastern Uele and Congo-Nile divide is well shown in Plates IX and X.

PLATE VII

The Border of a Clearing in the Ituri Forest toward Nala. A swampy depression in the foreground with typical plants of the secondary growth in the space cleared for the road: at the right of the bridge, elephant grass (*Pennisetum benthami*) and a young musanga (*Musanga smithi*); the slender tree in the left center is a *Uapaca*, and the broad-leaved bush in front of it a *Vernonia conferta*. Primary Rain Forest in the background, the majority of the trees being *Cynometra alexandri*, often reaching 150 feet. A few oil palms are visible toward the road.

The Lang-Chapin Expedition collected in the Lower Congo region, in the Ituri region at the northeast corner of the Rain Forest, and in the open country to the north of the Ituri watershed, reaching the divide between the Congo and Nile basins, a part of the Sudan. These three areas were inhabited by the following species:

I. Lower Congo

Hemidactylus mabouia
Hemidactylus longicephalus
**Agama colonorum*
**Varanus niloticus*
Gerrhosaurus nigrolineatus
**Mabuya maculilabris*
**Mabuya raddoni*
Mabuya acutilabris
Ablepharus cabindæ
Chamæleon etiennei
Chamæleon dilepis

II. Ituri

Gonatodes dickersoni
Hemidactylus muriceus
Hemidactylus fasciatus
Hemidactylus ituriensis
Hemidactylus richardsoni
Lygodactylus depressus
**Agama colonorum*
Agama atricollis
**Varanus niloticus*
Lacerta langi
Lacerta vauereselli
Bedriagaia tropidopholis
Algiroides africanus
Holaspis guentheri
**Mabuya maculilabris*
Mabuya polytropis
**Mabuya raddoni*
Lygosoma reichenowii
Lygosoma breviceps
Lygosoma fernandi
Feylinia currori
Chamæleon owenii
Chamæleon adolfi-friderici
Chamæleon ituriensis
Rhampholeon boulengeri

III. Uele

Hemidactylus brookii
Lygodactylus gutturalis
**Agama colonorum*
**Varanus niloticus*
Varanus exanthematicus
Ichnotropis chapini
Eremias garambensis
Gerrhosaurus zechi
**Mabuya maculilabris*
**Mabuya raddoni*
Mabuya sudanensis
Mabuya perrotetii
Mabuya quinquetæniata
Lygosoma sundevallii
Chamæleon gracilis
Chamæleon lævigatus

Out of eleven species from the Lower Congo, twenty-five from the Ituri, and sixteen from the Uele region, four are common to all three areas — *Agama colonorum, Varanus niloticus, Mabuya maculilabris, Mabuya raddoni* (see below for the discussion of the ranges of these species) — and this is the extent of the interrelationships, sufficient evidence of the distinctness of the faunæ. The forest fauna is equally distinct from the Sudanese and from the Angolan.

Analysis I.— Lower Congo

Exclusive of the four widespread forms (marked with an asterisk), the seven remaining may be divided as follows.

1. *Hemidactylus mabouia* is probably an import, occurring in the plantations along the West African coast from Angola to Kamerun.

Plate VIII

Interior of the Rain Forest on the Watershed between the Ituri and Uele Rivers, between Nala and Rungu. Tree ferns (*Cyathea*, probably *C. laurentiorum*), some of which reach 20 feet, in the swampy depression at the center. The heavily buttressed tree at the left is a muhindi (*Cynometra alexandri*) and that with a columnar trunk on the right is a mambao (*Macrolobium dewevrei*). The left front corner shows typical ground cover of the Rain Forest with large-leaved *Phrynium* and the broad-bladed forest grass (*Leptaspis conchifera*). Note also the huge creepers (*Landolphia*, *Lonchocarpus*, and others), hanging down from the crowns of the trees. The Rain Forest represents one of the primary divisions of the Ethiopian Region, both in its flora and fauna.

2. *Hemidactylus longicephalus, Gerrhosaurus nigrolineatus, Ablepharus cabindæ,* and *Chamæleon etiennei* are of restricted range, not occurring either in the forest or in German Southwest Africa. The affinities of *Gerrhosaurus,* however, are South African.

3. *Mabuya acutilabris* extends into German Southwest Africa, probably restricted to sandy areas.

4. *Chamæleon dilepis* (in an inclusive sense) is a species characteristic of the whole of the open country of Africa south of the Sahara.

The total relationship of the Lower Congo fauna is, therefore, inconclusive; somewhat isolated, and with general South African affinities.

Analysis II.— Ituri

Exclusive of the four widespread species, the twenty-one remaining are divided as follows.

1. Ten are identical with species of the Gaboon-Kamerun forest:

Hemidactylus muriceus
Hemidactylus fasciatus
Hemidactylus richardsoni
Holaspis guentheri
Mabuya polytropis
Lygosoma reichenowii
Lygosoma breviceps
Lygosoma fernandi
Feylinia currori
Chamæleon owenii

2. Ten are known only from the Ituri:

Gonatodes dickersoni
Hemidactylus ituriensis
Lygodactylus depressus
Bedriagaia tropidopholis
Algiroides africanus
Lacerta langi
*Lacerta vaueresell*i
Chamæleon ituriensis
Chamæleon adolfi-friderici
Rhampholeon boulengeri

Three of these are of obviously West African affinity. *Hemidactylus ituriensis* with *H. fasciatus, Lacerta langi* with *Lacerta echinata,* and *Rhampholeon boulengeri* with *R. spectrum.*

Three are of eastern relationship: *Gonatodes dickersoni* with *G. quattuorseriatus, Lygodactylus depressus* with *L. picturatus,* and *Algiroides africanus* with (?) *A. alleni.*

The four remaining are not obviously of either eastern or western relationship.

3. One species has invaded the forest from East Africa, *Agama atricollis.*

From these considerations it appears that, while there is a considerable eastern element in the Ituri fauna (4 species), its chief relationship should be considered western (13 species). The term "West African," previously applied to such species as *Hemidactylus fasciatus, Lygosoma fernandi,* and

Plate IX

Typical Aspect of Open Country in the Northeastern Uele, along the Road from Niangara to Faradje. The flat or slightly rolling country is covered with moderately high grass (*Imperata cylindrica* and various species of *Andropogon*); scattered, medium-sized trees from 20 to 30 feet high (*Dombeya*, *Kigelia*, etc.); and irregular scrubby bushes (*Bauhinia*, *Combretum* and others). A thorny element is represented by a few species of *Acacia* and the widely distributed *Zizyphus jujuba*.

Chamæleon owenii, is obviously due to a false point of view. These species should be referred to as Forest species.

Analysis III.—Uele

Exclusive of the four forms in common with the other areas, the twelve remaining are classed as follows.

1. Seven are identical with species known from the open country of West Africa, i. e., the Senegal-Togo region:

Hemidactylus brookii
Lygodactylus gutturalis
Varanus exanthematicus
Gerrhosaurus zechi
Mabuya perrotetii
Mabuya quinquetæniata
Chamæleon gracilis

2. Three are known only from the Uele:

Ichnotropis chapini
Eremias nitida garambensis
Mabuya sudanensis

The first with South African relationships, the last two strongly western.

3. Two are known from East Africa (and *not* in West Africa): *Lygosoma sundevallii,* widely distributed in East and South Africa; and *Chamæleon senegalensis lævigatus,* an East African subspecies of a Senegambian form.

In all, ten out of twelve species are of western origin or affinity.

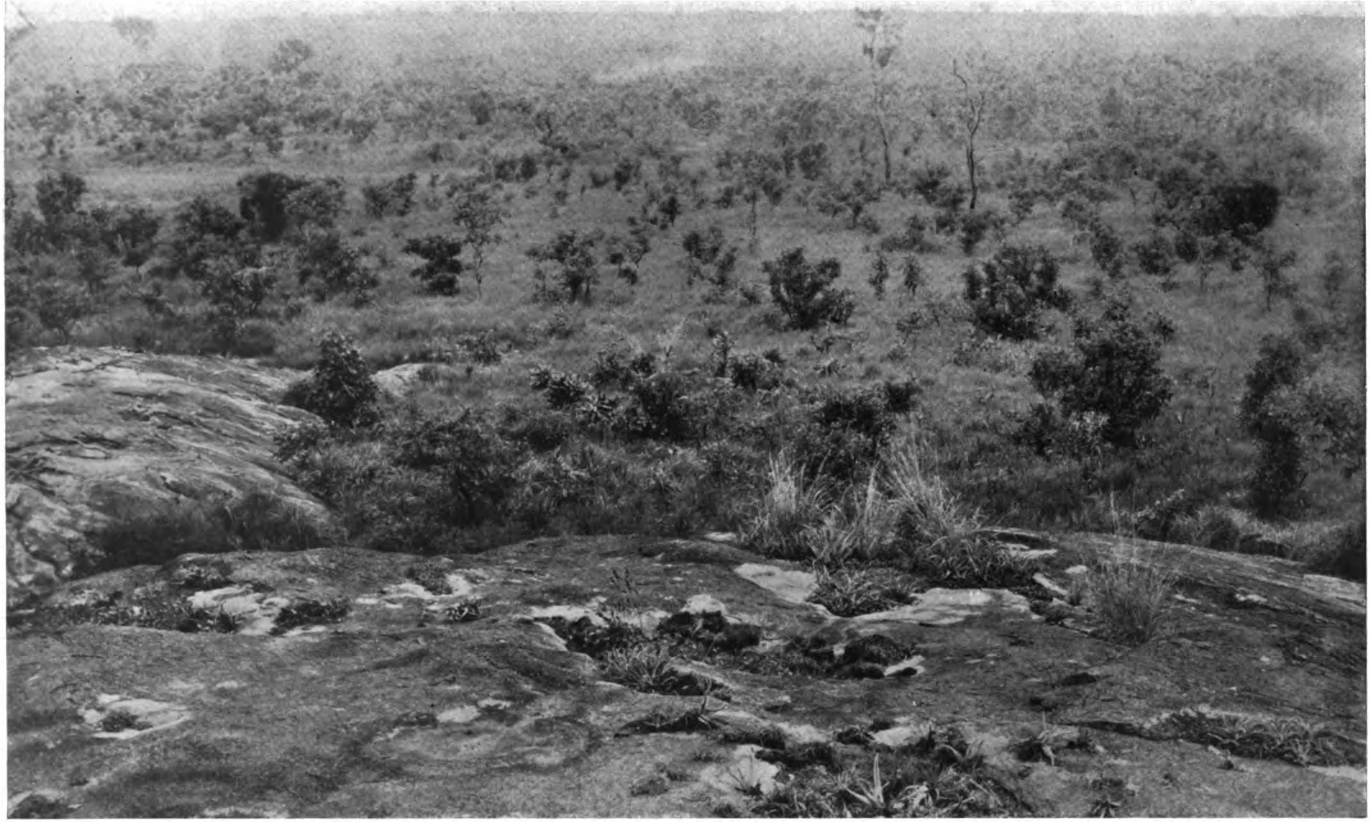
For the sake of simplification, in the above analyses of the Ituri and Uele faunæ, attention has not been directed to species like *Holaspis guentheri* and *Hemidactylus brookii* which occur also in East or Northeast Africa. These species present no difficulty, if it is borne in mind that it is not so much a relationship of the Central African species with the West African that is actually indicated as it is the reciprocal relation.

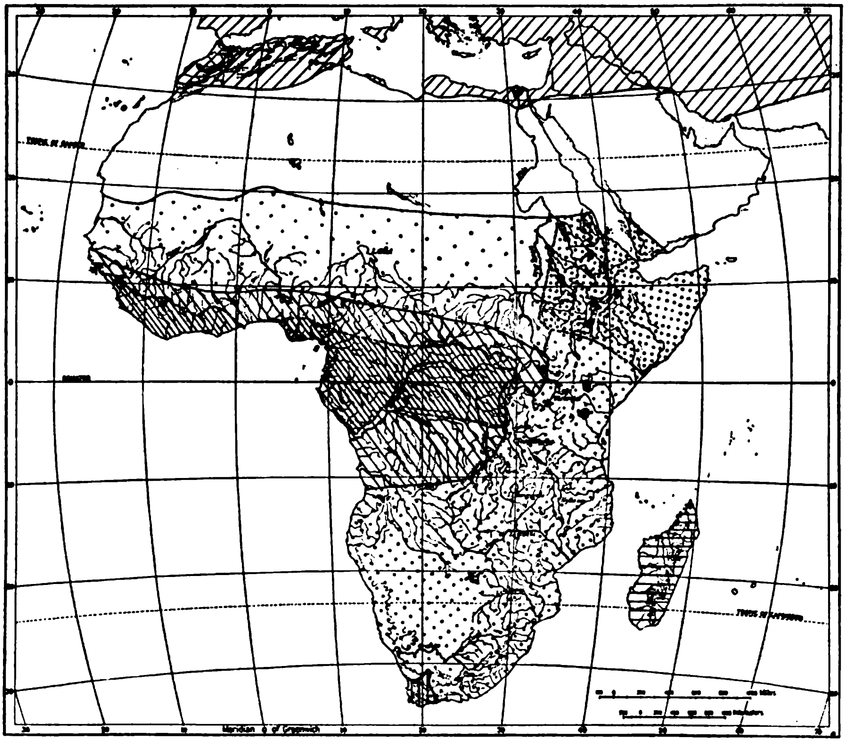
Corresponding to the term "Forest species" the term "Sudanese species" must be adopted for the very characteristic fauna between the Sahara and the Rain Forest. It is unfortunate that "Sudan" recalls to most people the Anglo-Egyptian Sudan rather than the Sudan proper, which covers the Sudanese Subprovince very exactly.

Turning now to the map of the botanical regions of Africa, prepared by Messrs. Lang and Chapin and Dr. Bequaert, it is at once evident that the distribution of the lizards is in much more exact accordance with the botanical distribution than is that of the fishes (Bull. Amer. Mus. Nat. Hist., XXXVII, p. 741, Map 2). All of the botanical subprovinces hold good for the lizards, with slight modification and the possible exception of the Southwestern Cape Region, which the writer has been unable to examine.

PLATE X

The Savannah North of Garamba, on the Watershed between the Nile and Congo Basins. The vegetation is typical of the transition zone between the mixed Uele flora and that of the Sudanese Subprovince (cf. Map 2). The grass is shorter and is chiefly composed of smaller *Andropogons*. Larger trees (such as *Lophira alata*) are very rare. The smaller woody plants include a great variety of species: *Protea, Sarcocephalus, Bauhinia, Dombeya, Uapaca, Grewia, Gardenia thunbergia* and others. In the depressions of the rocks, where moisture and humus accumulate, grow various grasses and a dwarf species of *Aloe*. Plates IX and X may be taken as representing an aspect of the second faunal and floral division of the Ethiopian Region, the Savannah Province; they also represent the first of the faunal subdivisions, the Sudanese Subprovince, which extends somewhat further toward the forest border than does the botanical division.





Map 2. The Botanical Regions of Africa, after Engler. Nearly coincident with faunal areas.

BOTANICAL REGIONS OF AFRICA

(After Engler)

I. MEDITERRANEAN REGION .... ▨
II. NORTH AFRICAN-ARABIAN DESERT REGION .... □
III. ETHIOPIAN REGION
  A. SAVANNAH PROVINCE
    1. Sudanese Subprovince .... ⁘
    2. Northeastern Subprovince .... ▒
    3. Eastern and Southern Subprovince .... ░
  B. WESTERN FOREST PROVINCE .... ▧
    Extent of Rain Forest indicated thus .... ▩
IV. SOUTHWESTERN CAPE REGION .... ▥
V. MALAGASY REGION .... ▤

The necessary modification is the extension of the Sudanese Subprovince to the forest border, which at once brings into prominence its close relations with the Eastern and Southern Subprovince. The botanical extension of the Western Forest Province outside the borders of the actually continuous Rain Forest, probably indicating a former wider extension of the forest, explains the close relationship of the Liberian fauna with that of the main area of forest and may explain the distribution of *Mabuya maculilabris* and *M. raddoni*, which could be considered Forest species coextensive with the original forest that have been able to meet the conditions of the open country (in part at least) after the retreat of the forest.

Species of the Sudan which best show the Sudanese relationship with the Southern Subprovince are *Varanus exanthematicus* (Map 12), *Ichnotropis chapini* (Map 14), *Lygosoma sundevallii*, and *Gerrhosaurus zechi* (Map 16).

The Northeastern Subprovince is characterized by many distinctive forms, and especially by the striking multiplicity of species of *Hemidactylus* (see especially Maps 12 and 16).

Without losing sight of the essential homogeneity of the fauna of the Forest Province, it may be pointed out that many forms present in the Kamerun-Gaboon region are absent in Liberia (the opposite has not been observed), and that there is a considerable difference between the Ituri and Gaboon faunæ, which may be bridged in part by further collections. The chameleons with a dorsal "fin" and *Poromera* in Gaboon, and the East African element in the Ituri fauna, with *Bedriagaia* distinctive, illustrate this subdivision (see Maps 4 and 13).

Similarly, there is some justification for a division of the Eastern and Southern Subprovince of the botanical map into East African and South African faunal areas, the former characterized by the great number of species of chameleon, the latter by the greater abundance of species and individuals of the Zonuridæ and Gerrhosauridæ. With these families of lizards the larger problems of zoogeography, which are beyond the scope of the present discussion, are touched upon.

The following papers (in the recent literature) deal with the extension of the Sudanese Subprovince: WERNER, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI, part 1, p. 1823; MÜLLER, 1910, Abh. Bayer. Akad. Wiss., 2 Kl., XXIV, p. 547; and NIEDEN, 1910, Arch. Naturg., LXXVI, Bd. I, Heft 1, p. 234.

Papers dealing with the relations of the Ituri and the Gaboon-Kamerun region: STERNFELD, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 197; and MÜLLER, 1913, Zool. Anz., XLI, p. 234.

Index to maps by provinces and subprovinces for which the distribution of a characteristic species is illustrated:

I.	Mediterranean Region	Map	12.
III. A.	Ethiopian Region, Savannah Province	“	3, 12, 16, 19, 20.
III. A. 1.	Sudanese Subprovince	“	6, 9, 10, 12, 16, 18, 21.
III. A. 2.	Northeastern Subprovince	“	12, 16.
III. A. 3.	Eastern and Southern Subprovince	“	11, 12, 14.
III. B.	Western Forest Province	“	3, 7, 8, 15, 22.

NOTE ON THE DISTRIBUTION OF THE AFRICAN TURTLES

The primary key to the understanding of the present distribution of reptiles in Africa has been found in the distinction between the Forest and Savannah Provinces. This division holds good with startling distinctness for the turtles collected by the present expedition in the Upper Congo region and the Sudan.

The Savannah Province is characterized by the genera *Testudo* and *Pelomedusa,* with *Cyclanorbis* restricted to the Sudanese Subprovince and *Homopus* to the Southern Subprovince. The distinctness of the ranges of *Kinixys belliana* on one hand and *Kinixys erosa* and *homeana* on the other, the first ranging over nearly the whole Savannah Province, the latter two confined to the Rain Forest, accords well with the natural subdivision of the genus. The Southern Subprovince is remarkable for the unique development of the genus *Testudo* which is differentiated into twelve species, only one of which (*Testudo pardalis*) ranges north of the Zambesi. *Testudo tornieri* is known only from German East Africa, and *Testudo calcarata* is Sudanese and Northeast African. Two Mediterranean species reach North Africa, making sixteen species of *Testudo* for the Continent.

Cycloderma, like *Kinixys,* occurs in both the forest and the savannah, but with a distinct species in each — *Cycloderma aubryi* in Gaboon, *Cycloderma frenatum* in the Eastern Subprovince.

Amyda triunguis, if really occurring throughout the Congo Basin, may be regarded as one of the species, like *Agama colonorum* and *Varanus niloticus* among the lizards, whose virility and adaptability make them more independent of their environment than are species more nearly in equilibrium. It might be thought that the water turtles would be less influenced by the presence or absence of the forest than the land turtles but, in the eastern end of the Rain Forest at least, this is not the case.

The distribution of the genus *Pelusios* is less consistent, though in the Ituri the only representative is *Pelusios gabonensis,* which appears to be confined to the continuously forested area. *Pelusios sinuatus* and *Pelusios nigricans* are evidently characteristic of the Eastern and Southern Subprovince, and *Pelusios adansonii* of the Sudanese Subprovince. The two species *niger* and *derbianus,* however, are recorded from Liberia to the Congo and from Gambia to Angola, respectively. The single record of *derbianus* from Uganda (Boulenger, 1911, Ann. Mus. Stor. Nat. Genova, (3) V, p. 162) may possibly indicate that it is a species of the Savannah Province, surrounding the forest.

Further records of *Amyda triunguis, Pelusios derbianus,* and *Pelusios niger* will have especial interest to students of the distribution of African reptiles.

TESTUDINATA

Key to the Genera of Turtles in Africa South of the Sahara

A. Shell with horny shields.
  B. Neck bending in a vertical plane; no intergular shield; digits not webbed. (Land turtles).
    C. Alveolar surface of the upper jaw with a median ridge. *Testudo.*
    CC. Alveolar surface of upper jaw without median ridge.
      D. Carapace hinged in adult, closing posteriorly; a submarginal shield present anteriorly............*Kinixys.*
      DD. Carapace not hinged behind; no submarginal. *Homopus.*
  BB. Neck bending sidewise; an intergular shield; digits more or less webbed. (Water turtles occasionally on land).
    C. Front lobe of plastron hinged in the adult.......*Pelusios.*
    CC. Front lobe of plastron not hinged............*Pelomedusa.*
AA. Carapace and plastron without horny shields. ("Soft shelled turtles").
  B. Plastron with a cutaneous femoral valve under which the hind limb may be concealed.
    C. Postorbital arch narrower than the orbit; neurals forming an incomplete series........................*Cyclanorbis.*
    CC. Postorbital arch wider than the orbit; neurals in a continuous series..................................*Cycloderma.*
  BB. No cutaneous femoral valves.........................*Amyda.*

TESTUDINIDÆ

Kinixys Bell

Kinixys erosa (Schweigger)

Plate XI, Figure 1; Map 3

Testudo denticulata (*non* Linnæus) SHAW, 1802, Zoology, III, p. 59, Pl. XIII.
Testudo erosa SCHWEIGGER, 1814, Prodr. Monogr. Chelon., p. 52.
Kinixys castanea BELL, 1827, Trans. Linn. Soc. London, XV, p. 398, Pl. XVII, fig. 1.
Kinixys erosa GRAY, 1831, Syn. Rept., p. 16.
Cinixys erosa DUMÉRIL AND BIBRON, 1835, Erpétol. Gén., II, p. 165.
Kinixys erosa GRAY, 1844, Cat. Tort., p. 12; 1855, Cat. Shield Rept., I, p. 13. DUMÉRIL, 1856, Rev. Mag. Zool., (2) VIII, p. 372. COPE, 1859 (1860), Proc. Acad. Nat. Sci. Phila., p. 294.
Cinixys erosa DUMÉRIL, 1861, Arch. Mus. Hist. Nat. Paris, X, p. 162. STRAUCH, 1862, Mém. Acad. Sci. St. Pétersbourg, (7) V, No. 7, p. 24.
Kinixys erosa GRAY, 1863, Proc. Zool. Soc. London, p. 196.
Cinixys erosa STRAUCH, 1865, Mém. Acad. Sci. St. Pétersbourg, (7) VIII, No. 13, p. 39. BOCAGE, 1866, Jorn. Sci. Lisboa, I, p. 40. GRAY, 1870, Suppl. Cat. Shield Rept., I, p. 13. PETERS, 1878, Monatsber. Akad. Wiss. Berlin, p. 611. SAUVAGE, 1884, Bull. Mus. Hist. Nat. Paris, IX, p. 200. BOETTGER, 1888, Ber. Senck. Ges., p. 12. BOULENGER, 1889, Cat. Chelon., p. 141. STRAUCH, 1892, Mém. Acad. Sci. St. Pétersbourg, (7) XXXVIII, No. 2, p. 61. BOCAGE, 1895, Herpétol. Angola, p. 1. SJÖSTEDT, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 6. BOULENGER, 1900, Proc. Zool. Soc. London, p. 447. TORNIER, 1902, Zool. Jahrb. (Syst.), XV, p. 665. BOULENGER, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 197. SIEBENROCK, 1907, Ann. Hofmus. Wien, XXII, p. 3, text-fig., Pl. I; 1909, Zool. Jahrb. (Suppl.), X, p. 509. NIEDEN, 1910, Fauna Deutschen Kol., Reihe 1, Heft 2, p. 4, fig.
Kinixys denticulata HALLOWELL, 1839, Proc. Acad. Sci. Phila., p. 161, Pls. VIII, IX.

Twenty-five specimens were collected, as follows: A. M. N. H. Nos. 10025 (September 1913), 10001–6, 10010, and 10024 (October 1909), and 10007–9 (November 1909) are from Avakubi; 10011 (January 1910), Bafwabaka; 10023 (November 1914), Banalia; 10012–13 (January and February 1910), Gamangui; 10014 (April 1910), 10019–22 (June and July 1914), 10015–18 (August 1910) Medje; and 10071 (November 1913), Niapu.

Sternfeld (1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 200) has recorded *Kinixys homeana* from the Ituri Forest. His specimen consists of head and limbs only, and he regards it as "eventuell *Cinixys erosa* angehörig." In view of the fact that *homeana* was not taken by the present expedition, it seems probable that *erosa* is the only species of *Kinixys* reaching the Ituri. The distribution of the genus is more fully discussed below, under *Kinixys belliana*.

The progressive simplification of the reverted border of the carapace, and the appearance and increasing distinctness of the carapacial hinge are excellently illustrated in the present series, which includes all stages from a juvenile without concentric sculpture on the shields, in which "egg-tooth" and umbilicus are still present, to an extremely old individual, with entirely smooth shields and the maximum hinge development.

A carapace and plastron (No. 10023) measuring 323 mm. in median length of carapace probably represents the maximum size recorded for the species. Siebenrock (1907, p. 4) mentions a male specimen 270 mm. long. The average size of an adult is probably between 200 and 230 mm.

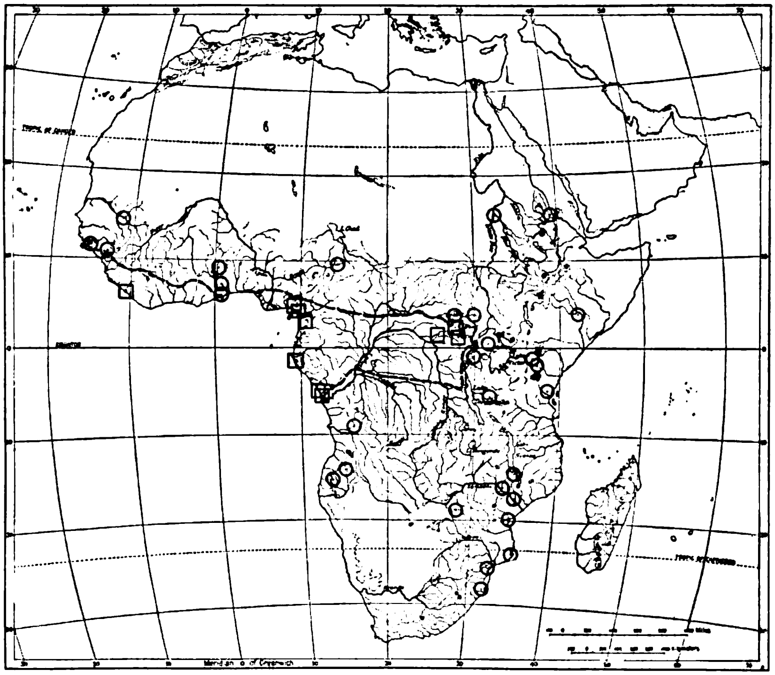
An egg, laid by a specimen in captivity during November 1913 (four were laid in all), has a rather calcareous shell. The shape is a somewhat flattened oval, measuring 40 × 36 × 31 mm.

The coloration is nearly uniform brown in the juvenile specimens, lighter in the oldest specimens, in which the pattern is often obscure. The medium-sized individuals show the distinctly *radiate* type of coloration which has been excellently figured by Siebenrock (*loc. cit.*).

The measurements of twenty-one specimens are arranged below in order of size. The length of the carapace and plastron are measured in the median line with calipers; the width and depth are maxima.

A. M. N. H No.	Sex	Length Carapace	Width Carapace	Length Plastron	Width Plastron	Depth
10019	♀	46 mm.	42 mm.	43 mm.	32 mm.	20 mm.
10013	♀	47	43	42	33	18
10016	♀	55	50	47	39	22
10014	♀	60	53	53	41	23
10015	♀	61	55	54	45	24
10002	♀	68	55	64	49	30
10022	♀	72	62	66	54	29
10021	♀	81	63	71	57	30
10010	♀	84	64	72	55	32
10001	♀	94	71	85	62	39
10009	♀	112	84	111	78	47
10025	♀	131	94	120	89	55
10003	♂	159	111	146	102	62
10004	♀	159	113	152	103	58
10024	♀	164	120	157	106	68
10007	♂	170	118	155	108	61
10006	♂	192	123	172	112	68
10005	♂	192	123	173	108	65
10011	♂	210	140	191	131	66
10012	♂	210	146	195	126	70
10023	♂?	323	236	289	222	122

"*Kinixys erosa* is the only land turtle found in the part of the Rain Forest we visited, and, like its relative (*Kinixys belliana*) in the northern savannah, is fond of marshy sites. During the day it hides beneath logs, roots, and heaps of dead and living vegetation, sometimes completely covering itself with débris. The projecting forked gular portion of the plastron and the slightly upturned edges of the carapace are very useful in this task; the head is partly retracted, and the feet then push and wedge until the turtle is hidden from view. This turtle is highly prized as a titbit by the natives, and therefore is never allowed to escape. Dogs, so commonly used for hunting in these regions, are undoubtedly attracted by the odor which this species emits.



Map 3. Distribution of *Kinixys*.
☐ *Kinixys erosa*. Characteristic of the Western Forest Province.
○ *Kinixys belliana*. A species of the Savannah Province.

"The yellowish-brown, radiate pattern on the slightly ridged or smooth shields, the anteriorly depressed, strongly arched carapace, with its hinged rear portion and everted border, are typical of this species (Plate XI, Figure 1).

"After seeing more than one hundred and fifty adult specimens, we thought the length of the carapace would not exceed eight and a quarter inches (210 mm.), and we were therefore surprised to find a huge shell, measuring 12.75 inches (323 mm.), in the hands of Mr. Van de Voorde, a

Belgian official, who kindly contributed it to our collection. He had received it from the Wangelima who had caught it in the forests near Banalia, on the Aruwimi.

"The natives claim that this turtle lays as many as a dozen eggs in the sandy ground, so common in the marshy parts of these regions, and covers them with dead leaves. A female we kept alive for a while in November laid one night four oval eggs an inch and a quarter in length (32 mm.); the shells were slightly calcareous, yet leathery enough to stand indentation without breaking. Dissection of this specimen revealed four well-formed and two smaller eggs which would have added six to the set. The various stages of the young (characterized by strongly denticulate carapaces), observed throughout the year, would indicate that there is no definite breeding season" [H, L.].

Kinixys belliana Gray

Plate XI, Figure 2; Map 3

Kinixys belliana GRAY, 1831, Synopsis Rept., p. 69.

Cinixys belliana DUMÉRIL AND BIBRON, 1835, Erpétol. Gén., II, p. 168.

Kinixys (*Cinothorax*) *belliana* FITZINGER, 1835, Ann. Wiener Mus. Naturg., I, p. 111.

Cinixys (*Cinothorax*) *bellianus* FITZINGER, 1843, Syst. Rept., p. 29.

Kinixys belliana GRAY, 1844, Cat. Tort., p. 12; 1855, Cat. Shield Rept., p. 13, Pl. II.

Cinixys belliana STRAUCH, 1862, Mém. Acad. Sci. St. Pétersbourg, (7) V, No. 7, p. 24; 1865, (7) VIII, No. 13, p. 40. BLANFORD, 1870, Zool. Abyssinia, p. 444.

Kinixys belliana GRAY, 1870, Suppl. Cat. Shield Rept., I, p. 13.

Cinixys belliana SCLATER, 1871, Proc. Zool. Soc. London, p. 544. PETERS, 1879, Monatsber. Akad. Wiss. Berlin, p. 202; 1882, Reise nach Mossambique, III, p. 5. BOULENGER, 1889, Cat. Chelon., p. 143. BOETTGER, 1889, Ber. Senck. Ges., p. 295. STRAUCH, 1892, Mém. Acad. Sci. St. Pétersbourg, (7) XXXVIII, No. 2, p. 62. GÜNTHER, 1894, Proc. Zool. Soc. London, p. 85. BOCAGE, 1895, Herpétol. Angola, p. 2. DEL PRATO, 1895, Atti Soc. Italiana Sci. Nat., XXXV, p. 19. JOHNSTON, 1897, British Central Africa, p. 356. TORNIER, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 2; 1900, Zool. Jahrb. (Syst.), XIII, p. 582; 1901, Beiheft, Arch. Naturg., LXVII, p. 66; 1902, Zool. Jahrb. (Syst.), XV, pp. 580, 665. BOULENGER, 1902, in Johnston, Uganda Protectorate, p. 445; 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 197; 1905, Proc. Zool. Soc. London, II, p. 252; 1906–7, Mem. Proc. Manchester Lit. Philos. Soc., LI, p. 6. SIEBENROCK, 1906, in Voeltzkow, Reise in Ost-Afrika, II, p. 2. BOULENGER, 1907, Proc. Zool. Soc. London, p. 483, fig. 140. SIEBENROCK, 1907, Ann. Hofmus. Wien, XXII, p. 4. CHUBB, 1908, Ann. Mag. Nat. Hist., (8) II, p. 220. OHDNER, 1908, Arkiv Zool. Stockholm, IV, No. 18, p. 2. CHUBB, 1909, Proc. Zool. Soc. London, p. 592. SIEBENROCK, 1909, Zool. Jahrb. (Suppl.), X, p. 510. MEEK, 1910, Publ. Field Mus. Zool., VII, p. 414. ROUX, 1910, Rev. Suisse Zool., XVIII, p. 100. BOULENGER, 1911, Ann. Mus. Stor. Nat. Genova, (3) V, p. 162. STERNFELD, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 200. NIEDEN, 1913, Mitt. Zool. Mus. Berlin, VII, p. 54.

Homopus nogueyi Lataste, 1886, Le Natur., III, p. 286. Boulenger, 1889, Cat. Chelon., p. 148. Tornier, 1901, Beiheft, Arch. Naturg., LXVII, p. 66. Duerden, 1906, Rec. Albany Mus., I, p. 408.

Cinixys nogueyi Siebenrock, 1903, Sitzber. Akad. Wiss. Wien (math.-natur.), CXII, part 1, p. 442; Ann. Hofmus. Wien, XX, p. 6.

Cinixys belliana nogueyi Boulenger, 1906, Ann. Mus. Stor. Nat. Genova, (3) II, p. 197.

Homopus darlingi Boulenger, 1902, Proc. Zool. Soc. London, II, p. 15, Pl. iv; 1907, p. 483.

Twenty-three specimens of *Kinixys belliana* were collected in the Uele region: A. M. N. H. Nos. 10041–42 (February and October 1912) are from Faradje; 10047 (June 1912), Garamba; 10026–40, 10046 (December 1910), Niangara; 10043–45, 10048, Uele region.

The range of *Kinixys belliana* circumscribes the forest, entering it only in Liberia, if at all (Map 3). *Kinixys erosa* and *homeana* are rarely recorded outside of the Rain Forest, and never outside of the Forest Province of the botanical map.

Siebenrock (1907, p. 4) has added to the knowledge of the remarkable structural differences between *belliana* and the other two species, and the retention of Fitzinger's section *Cinothorax* for *belliana* is natural and logical. The differences may be summarized as follows:

	Kinixys, s. str.	*Cinothorax*
Habitus	Flattened	High
Shell border	Reverted, denticulate in young	Not reverted, not denticulate
Gular shields	Large, projecting, quadrangular	Small, nearly triangular
Pectoral suture	Long	Short
Postorbital arch	Well developed	Greatly reduced
Windpipe	Elongate, reverted	Normal, straight
Coloration	Radiate	Zonary
Range	Forest Province	Savannah Province

One specimen in the present series (No. 10048) has only three claws on each hind foot, all the others having four. The development of the fifth claw on the fore limb is variable, when present; it is absent in two specimens, while a third has five claws on one side, four on the other.

The distinction from *Homopus*, with which juvenile specimens have been repeatedly confounded, is rendered easy even before the development of the carapacial hinge by the presence of the submarginal shield beneath the anterior border of the carapace, as demonstrated by Siebenrock (*loc. cit.*).

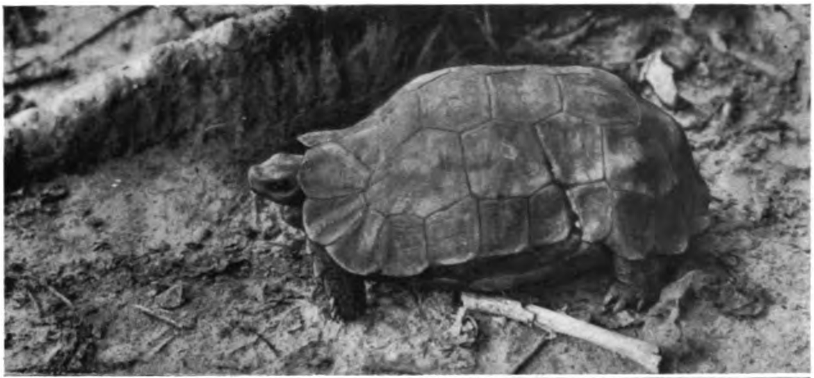
In one specimen, No. 10029, the pectoral shields do not form a suture.

PLATE XI

Figure 1. *Kinixys erosa* (Schweigger). The average size of the adult is probably 200–230 mm.

Figure 2. *Kinixys belliana* Gray. A. M. N. H. No. 10042; length 230 mm.

Figure 3. *Pelusios nigricans* (Donndorff). A. M. N. H. No. 10063; ♂; length 290 mm.



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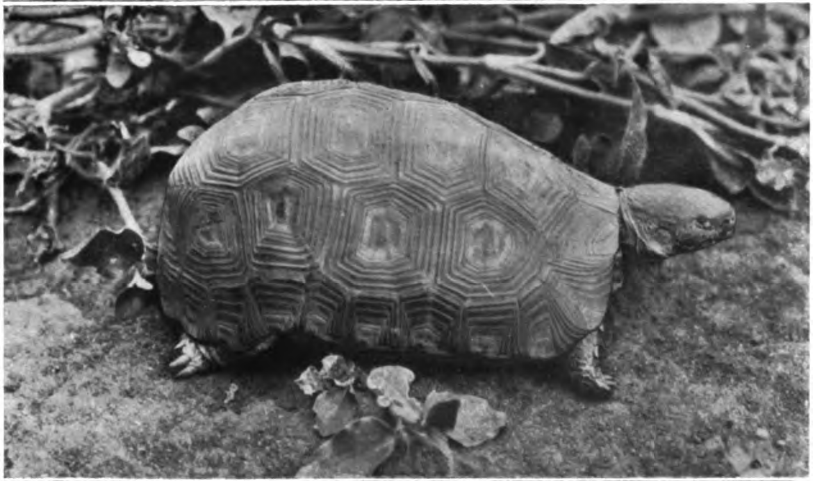

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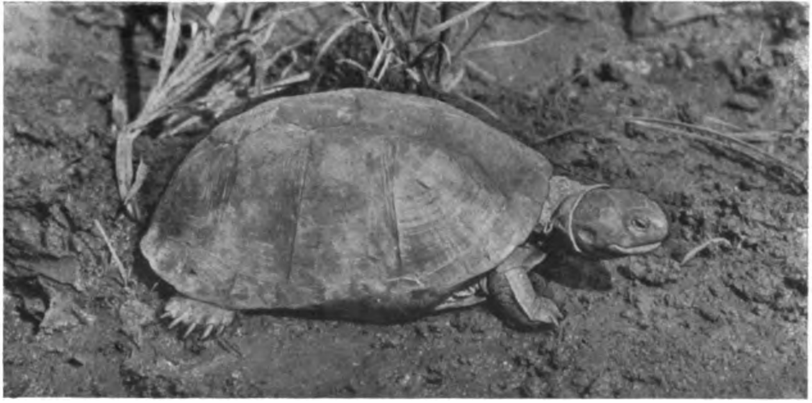

3

No. 10047 is abnormal in having one of the anterior costal plates fused with the first neural; and a supernumerary marginal is introduced on the same side.

The coloration is very variable, usually darker in the females; the pattern in the young specimens is typically zonary, becoming secondarily radiate in the older individuals.

The measurements of nine specimens are arranged below in order of size.

A. M. N. H. No.	Sex	Length Carapace	Width Carapace	Length Plastron	Width Plastron	Depth
10047	♀	47 mm.	44 mm.	41 mm.	37 mm.	24 mm.
10026	♂?	86	60	71	56	35
10030	♀	90	64	78	56	39
10045	♀	159	92	132	90	66
10028	♂	163	93	139	87	66
10040	♂	174	108	152	100	69
10048	♀	177	111	159	101	79
10027	♀	187	118	162	109	86
10029	♀	194	112	164	113	85

"Our largest specimen of *Kinixys belliana* has a shell 7.65 inches long. The carapace is always more vaulted, usually with more clearly marked ridges on the shields and a better defined, zonary yellowish pattern than its relative of the Rain Forest, which it otherwise resembles (Plate XI, Figure 2).

"These land turtles are fairly common in the savannah of the northeastern Uele, but are scarcer in the still drier part of the Sudan adjoining the Congo-Nile divide. They are fond of the moist areas bordering swamps or shallow watercourses, where they find food and shelter in the dense undergrowth. Like most land turtles, they are nocturnal in habit and are seldom seen during the day. In the rainy season they shift and cannot be found in places where the natives are wont to look for them in the dry period.

"In June, at the beginning of the rainy season, a shallow pool, only fifteen feet in length, but overgrown with aquatic vegetation, contained at least three of these turtles. The barefooted natives are afraid of being bitten by the small crocodiles which sometimes infest such water-holes, and therefore use the reverse end of their spears to prod the bottom. As soon as the plants are moved by an escaping turtle or one is actually hit by a spear, the natives make a rush for it. When it has been thrown on land, with the plastron up, the turtle has no difficulty in righting itself and walks away, for ten or fifteen feet, as fast as a man; when halted, it may skulk for a time, with feet and head partly drawn inside the carapace, or may feign death. One carried to the river, walked to the edge of the steep bank and without hesitation dropped into the water, where it seemed at ease, although powerless against the strong current. Reaching shore, it rested awhile and then hobbled off toward the shelter of some roots. Another specimen had been drowned in an eel-pot set in a barrage across a rapid into which it had evidently been swept when attempting to cross the river.

"When handled, this species tries to scratch, withdraws its head into the shell and snaps the beak, hisses, and sometimes gives off through the cloaca small quantities of a strong smelling fluid. When further annoyed, it expels the air from the lungs and protects its more vulnerable parts by drawing the forelimbs over the head and shutting down the hinged posterior portion of the carapace. How timid this turtle is may be shown by the fact that for days at a time it makes no attempt to move when the natives carry it either in a basket or suspended by a string fastened to its hind limbs.

"*Kinixys belliana* is the only turtle in this region that estivates during the dry season, from December to May in the Uele, thus escaping the annual grass fires; it may be found beneath roots of trees, in the cavities of large termite hills, or perhaps several inches below the surface of the ground. This habit probably has little connection with lack of food since it is known that most turtles can live for many months without nourishment. In February and March after the grass fires, the Logo and Azande, near Faradje, arrange turtle-hunting parties and secure as many as half a dozen in one day. Spears, with a heavy, pointed, or chisel-like iron on the reverse end, are used to unearth the turtles, which small hunting dogs usually locate. The natives of the northeastern Congo consider land turtles greater delicacies than even the aquatic species — perhaps on account of the strong musky odor; in fact, they prefer this turtle to chicken. The rear portion of the carapace is easily cut off at the hinge, and the meat is carefully removed from the shell and stewed with pepper for a considerable time. Many parasites, especially nematodes, are found in the intestines, which the natives do not remove, believing they add to the flavor. The stomach and cloaca, however, are usually emptied, but the other parts are thrown into the pot uncleaned.

"These turtles seem to have few enemies aside from man. Once, however, on the plains we found portions of shell of one recently killed. From the tracks and from the teeth marks on both plastron and carapace, it could easily be ascertained that a leopard had satisfied its hunger; and the natives then said that neither the lion nor leopard would pass a turtle.

"On account of the protection turtles derive from the shell, the facility with which they withdraw therein, their proverbial slowness and endurance, the ability to remain immovable for a long time and to escape when unobserved, they play an active part in native superstition. Their skulls, vertebræ, leg bones, and parts of the shell are worn extensively by natives in the belief that they transmit the qualities cited. The story of the race between the turtle and the elephant, with the generally accepted ending, has wide circulation in the Ituri and Uele districts" [H. L.].

PELOMEDUSIDÆ

Pelusios Wagler[1]

Pelusios nigricans (Donndorff)

Plate XI, Figure 3; Text Figure 1

Testudo nigricans DONNDORFF, 1798, Zool. Beitr., III, p. 34.
Sternothærus nigricans BOULENGER, 1889, Cat. Chelon., p. 195. SIEBENROCK, 1909, Zool. Jahrb. (Suppl.), X, pp. 557, 558. MASI, 1911, Boll. Soc. Zool. Italiana, (2) XII, p. 131. STERNFELD AND NIEDEN, 1911, Mitt. Zool. Mus. Berlin, V, p. 385. STERNFELD, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 201. NIEDEN, 1913, Mitt. Zool. Mus. Berlin, VII, p. 59.

The further bibliography and synonymy of this species will be found in Boulenger, 1889, p. 195, and Siebenrock, 1909, p. 557.

The difficulty in distinguishing *Pelusios nigricans* and *Pelusios sinuatus* leads the writer to record the present specimens under the older name. From the discussion of Nieden, (1913, p. 55 *et seq.*) it appears not unlikely that *sinuatus* will have to be placed in the synonymy of *nigricans*. The relations of the present specimens will be discussed more fully below.

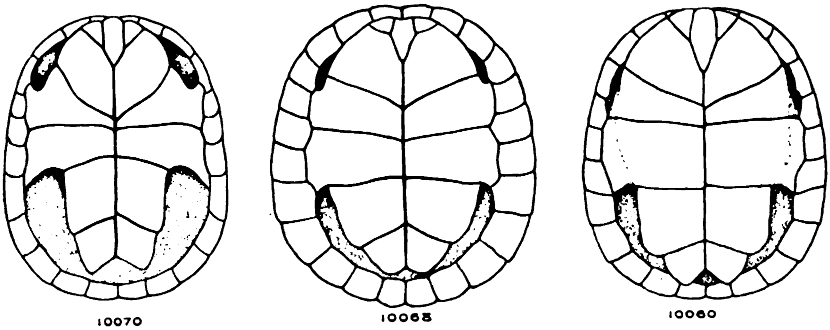

Fig. 1. Plastral views of juvenile *Pelomedusa galeata* (10070, × .48), *Pelusios gabonensis* (10068, × .73) and *Pelusios nigricans* (10060, × .56). Compare the extent to which the pectoral shields enter the bridge.

Six specimens were taken at Faradje: A. M. N. H. Nos. 10060–61 (February 1911), 10062 (March 1911), 10063 (January 1912), 10064–65 (October 1912). All of these specimens were taken in the Dungu River.

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[1] Stejneger, 1902, Proc. Biol. Soc. Wash., XV, p. 237.

The presence of an essentially East African species in this part of the Sudan is not without precedent (cf. *Ichnotropis*, *Lygosoma sundevallii*, and *Chamæleon lævigatus*, below). The occurrence of the present species is anomalous, however, for Werner's expedition to the Sudan, collecting at Gondokoro on the Nile, less than 150 miles to the northeast, secured only *Pelusios adansonii* (Schweigger), a form well known from the Senegambian area. (Previously recorded from the White Nile by A. Duméril.) Since the faunal affinities of the Uele region are more distinctly Senegambian than those of the area reached by Werner, *adansonii* would have been expected in the Uele, where it may yet be found. *Pelusios nigricans*, furthermore, is restricted by Siebenrock (1909, p. 557) to a somewhat more southern range, the genus being represented by *sinuatus* in the headwaters of the Nile, so that, of the two, *sinuatus* would be expected in the Uele. Geographical considerations thus lead to the union of *sinuatus* with *nigricans*. The absence of *Pelusios adansonii* from the Uele is unexplained and probably accidental, as is also the absence of *sinuatus* at Gondokoro. The eastward extension of the range of *adansonii* is normal, contrary to Siebenrock's impression, the discontinuity between the eastern and western records being simply an unexplored region. Future collections from the Niger, the Benue, and probably the Ubangi, may be expected to bridge the gap.

The six specimens agree with the older descriptions of *Pelusios sinuatus* in the strongly bicuspid character of the upper jaw, but this has been shown to be an insufficient distinction. They agree with Siebenrock's revised description of *Pelusios nigricans* in having the front lobe of the plastron longer than the abdominal suture, the outer border of the humerals longer than that of the pectorals, and the posterior border of the carapace entire; while in size they correspond best with *sinuatus*.

The measurements appear below.

A. M. N. H. No.	Sex	Length Carapace	Width Carapace	Length Plastron		Width Plastron	Depth
				Ant. Lobe	Post. Lobe		
10060	?	67 mm.	55 mm.	25 mm.	36 mm.	42 mm.	30 mm.
10065	♀	241	173	82	129	124	
10053	♀	250	177		137	132	106
10062	♂			83	126	117	
10063	♂	290	185	89	136	130	92

"These water turtles have a depressed, smooth carapace of dirty greenish brown, and are further differentiated by a comparatively blunt head and paddle-like feet; the black claws are especially sharp on the hind limbs (Plate XI, Figure 3). The species attains much larger proportions than specimens in the collection would indicate, sometimes reaching a length of 15 inches. The shallow watercourses and their lakelike expanses, quiet coves, open stretches of papyrus swamp, and stagnant pools, perhaps miles from running water, are the habitual haunts of the turtles, which, however, are not gregarious — at least most of the thirty or so captured were taken singly. It is probable that they travel great distances at the height of the rainy season, when inundations often connect widely separate swamps and water-holes. On land they proceed as easily as their terrestrial relatives. Those I saw were not basking but were resting in submerged débris or aquatic vegetation, with head or shell partly out of the water. They are shy, and of those collected by the expedition all were taken in traps or nets by fishermen, except a very few gathered in shallow pools.

"In February, at low water, I found the nest of one of these turtles at the edge of an island in the Dungu River near Faradje. It was situated more than two feet above water-level and contained seven oval eggs about an inch and a half in length. Although the eggs had been laid only recently, the slightly flexible shells, originally white, had been tinted brown by the two-inch layer of dry sand covering them" [H. L.].

Pelusios gabonensis (A. Duméril)

Text Figure 1

Pentonyx gabonensis DUMÉRIL, 1856, Rev. Mag. Zool., (2) VIII, p. 373; 1861, Arch. Mus. Hist. Nat. Paris, X, p. 164, Pl. XIII, figs. 2, 2a.

Pelomedusa gabonensis STRAUCH, 1862, Mém. Acad. Sci. St. Pétersbourg, (7) V, p. 45.

Pelomedusa (*Pentonyx*) *gabonensis* STRAUCH, 1865, Mém. Acad. Sci. St. Pétersbourg, (7) VIII, p. 107.

Sternothærus gabonensis BOULENGER, 1889, Cat. Chelon., p. 197; 1900, Proc. Zool. Soc. London, p. 447. TORNIER, 1902, Zool. Jahrb. (Syst.), XV, p. 665. SIEBENROCK, 1903, Zool. Anz., XXVI, p. 197; 1905, XXVII, p. 461; 1907, Ann. Hofmus. Wien, XXII, p. 6; 1909, Zool. Jahrb. (Suppl.), X, p. 560.

Sternothærus derbianus (part) GRAY, 1863, Ann. Mag. Nat. Hist., (3) XIII, p. 167; 1863, Proc. Zool. Soc. London, p. 194.

Sternothærus steindachneri SIEBENROCK, 1901, Zool. Anz., XXV, p. 6; 1903, XXVI, p. 197.

There are fifteen specimens, readily identified with this species, all from the streams of the Ituri Forest except the first mentioned, which is from the Poko, an affluent of the Bomokandi-Uele. A. M. N. H. No. 10067 (September 1913) is from Akenge; 10051–52 (January 1910), 10053 (February 1910), Gamangui; 10054–57 (August 1910), 10058–59 (September 1910), Medje; 10068 (January 1914), Niapu; 10069 (July 1913), Pawa; 10066 (August 1913), Poko; 10049–50 (August 1909), Stanleyville.

Pelusios gabonensis has hitherto been recorded from the West African forest region, from Liberia to Gaboon (absent in Togo). It is of great interest to find it abundant in the Ituri region, evidently a species characteristic of the entire Rain Forest. The influence of the Rain Forest in determining distribution is even more strikingly shown in this case than in that of *Kinixys,* for the difference in habitat for the fluviatile turtles is much less pronounced.

The imperfect development of the plastral hinge in this species and *adansonii,* which distinguishes them from the other species of *Pelusios,* is of interest. All stages in the postembryonic development of *gabonensis* are represented in the present series, from a specimen of 42 mm., with umbilicus and egg tooth and no plastral hinge, to a presumably adult individual of 192 mm. In the younger specimens the pectoral shields enter strongly into the bridge, in fact to practically the same extent as in *Pelomedusa galeata,* which never develops a hinge. These relations are exhibited in the accompanying figures of the plastra of juvenile *Pelusios nigricans, Pelusios gabonensis,* and *Pelomedusa galeata* (Fig. 1).

The measurements of fifteen specimens are tabulated below.

A. M. N. H. No.	Sex	Length Carapace	Width Carapace	Length Plastron	Width Plastron	Depth
10069	♀	41 mm.	33 mm.	35 mm.	25 mm.	15 mm.
10059	♀	45	41	41	30	15
10068	♀	53	47	46	33	20
10049	♀	59	52	54	40	23
10058	♀	61	53	57	42	24
10050	♀	68	58	65	45	28
10067	♀	69	58	65	44	25
10054	♀	93	73	91	59	37
10052	♀	117	84	110	68	40
10066	♂	117	87	109	68	36
10051	♀	126	90	118	72	45
10056	♀?	141	105	128	88	
10057	♀?	168	120		97	
10055	♂	184	132	170	110	49
10053	♂	192	140	168	118	58

"*P. gabonensis* resembles *P. nigricans* in essential features, with the exception of its imperfectly developed plastral hinge. Although typical of the extensive river system of the Rain Forest, very large specimens are more fluviatile in habit than the young or half grown, which may be found singly everywhere in the sufficiently swampy parts of their habitat. They are eaten by all natives. One huge specimen, with a shell more than a foot in length, was caught by the Medje in the Nepoko River; in the folds of its hind limbs many small leeches were fastened. Another, equally large, was seen in the fish market at Coquilhatville. They are often drowned in fish traps" [H. L.].

Pelomedusa Wagler

Pelomedusa galeata (Schoepff)

Text Figure 1

Testudo galeata SCHOEPFF, 1792, Testud., p. 12, Pl. III, fig. 1.

Pelomedusa galeata WAGLER, 1830, Syst. Amph., Pl. III, figs. 36–38. BOULENGER, 1889, Cat. Chelon., p. 197. SIEBENROCK, 1909, Zool. Jahrb. (Syst.), X, p. 561. LÖNNBERG, 1910, in Sjöstedt, Kilimandjaro-Meru Exp., I, part 4, p. 2. MEEK, 1910, Publ. Field Mus. Zool., VII, p. 414. NIEDEN, 1910, Fauna Deutschen Kolon., Reihe 1, Heft 2, p. 7, fig. 14. SIEBENROCK, 1910, Sitzber. Akad. Wiss. Wien (math.-natur.), CXIX, part 1, p. 734. WERNER, 1910, Denkschr. Med. Naturw. Ges. Jena, XV, p. 305. BOULENGER, 1911, Ann. Mus. Stor. Nat. Genova, (3) V, p. 162. STERNFELD, 1911, Fauna Deutschen Kolon., Reihe 4, Heft 2, p. 53, fig. 65; 1911, Mitt. Zool. Mus. Berlin, V, p. 411; 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 201. NIEDEN, 1913, Mitt. Zool. Mus. Berlin, VII, p. 64.

The further bibliography of this species, probably the most extensive for any African turtle, may be found under Boulenger (1889, p. 197) and Siebenrock (1909, p. 561).

There is only a single specimen in the collection: No. 10070 (June 1912) from Garamba.

The distribution of *Pelomedusa galeata* is distinctly that of an "open country" species. Locally it may enter the forest border as in Kamerun, but the writer is unable to find a definite record from Gaboon, which is included in its range by Siebenrock (1909, p. 562). The range may be fairly well defined as Africa south of the Sahara Desert, exclusive of the continuous rain forest. The extreme records are Senegambia (Steindachner, 1870, Sitzber. Akad. Wiss. Wien math.-natur., LXII, part 1, p. 326), Eritrea (Peracca, 1904, Boll. Mus. Torino, XIX, No. 467, p. 1), Cape Colony (Boettger, 1887, Ber. Senck. Ges., p. 140), Lower Congo (Boettger, 1889, Ber. Senck. Ges., p. 13), and Sennar (Peters, 1863, Monatsber. Akad. Wiss. Berlin, p. 271).

The measurements of the single female juvenile specimen (A. M. N. H. No. 10070) are as follows: length carapace, 78; width carapace, 61; length, plastron, 69; width plastron, 50; depth, 28 mm.

"At the edge of a plateau, half a mile from the nearest brook, was a huge swamp. In June most of the surface was cracked and barren, but at the lowest point high sedges and reeds indicated the presence of water. Here we found not only the specimen described but another of its kind, nearly twice as large, and a land turtle (*Kinixys belliana*). Undoubtedly *Pelomedusa galeata*, like its relatives, wanders from pool to pool at the height of the rainy season" [H. L.].

LORICATA (CROCODILIA)

Crocodylidæ

Synopsis of the African Crocodiles

The African crocodiles may be distinguished by means of external characters as follows:

A. Snout greatly elongate, gavial-like................*C. cataphractus.*

AA. Snout moderate; teeth $\frac{18\text{–}20}{15}$; four large nuchal shields forming a square, with a lateral shield on each side; keels of the nuchals directed upward...............................*C. niloticus.*

AAA. Snout short; teeth $\frac{17}{15}$; a large bony plate in the eyelid; nuchals 6, in 3 pairs longitudinally placed; keels of the nuchals very strong, laterally directed.

- B. Snout strongly upturned in front..........*Osteolæmus tetraspis.*
- BB. Snout not upturned anteriorly..........*Osteoblepharon osborni.*

By means of skull characters they may be separated as follows:

A. Nasal bones anteriorly produced, dividing the nasal aperture; a large bony plate in the eyelid; supratemporal fossæ small. *Osteolæmus* (one species, *O. tetraspis*).

AA. Nasals not produced into a nasal septum, entering the nasal aperture or excluded from it by the premaxillaries.

- B. A large bony plate, composed of two pieces, in the eyelid; frontal entering the supratemporal fossæ which are small. *Osteoblepharon* (one species, *O. osborni*).
- BB. A small anterior bony plate in the eyelid; frontal not entering the supratemporal fossæ which are large............*Crocodylus.*
  - C. Snout elongate, mandibular symphysis reaching the 8th tooth; nasals usually separate from the nasal aperture. *C. cataphractus.*
  - CC. Snout moderate, mandibular symphysis reaching the 4th tooth; nasals usually entering the nasal aperture. *C. niloticus.*

Crocodylus Laurenti

Crocodylus cataphractus Cuvier

Plate XII, Figure 1; Text Figures 3, 4, and 5

Crocodilus cataphractus Cuvier, 1825, Ossemens Fossiles, V, part 2, p. 58, Pl. v. figs. 1 and 2. Boulenger, 1889, Cat. Chelon., p. 279. Bocage, 1895, Herpétol. Angola, p. 9. Sjöstedt, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 7. Boulenger, 1900, Proc. Zool. Soc. London, p. 447. Werner, 1902, Verh. Zool.-Bot. Ges. Wien, LII, p. 348. Johnston, 1906, Liberia, II, p. 817, fig. 309; 1908, George Grenfell and the Congo, II, pp. 929, 950.

Mecistops cataphractus Tornier, 1901, Beiheft, Arch. Naturg, LXVII, p. 66; 1902, Zool. Jahrb. (Syst.), XV, pp. 579, 663. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 53.

For the earlier bibliography and synonymy of this species, reference may be made to Boulenger (1889, p. 279).

Seven specimens were secured by the Lang-Chapin Expedition: A. M. N. H. Nos. 10072 (October 1909), 10076 (August 1914) are from Avakubi; 10078 (August 1915), Banana; 10075 (April 1911), Dungu River at Faradje; 10077 (July 1915), Malela; 10073 (April–May 1910), Nepoko River near Medje; 10074 (December 1910), Niangara.

The distribution of *C. cataphractus* appears to be definitely West African, the only East African record being from a tributary of Lake Tanganyika at Ujiji, i. e., within the Congo Basin. As in the case of *Crocodylus niloticus*, the distribution does not seem to be materially affected by the Rain Forest, since the species occurs in Togo, in the Lower Congo, in the Uele, and at Ujiji, as well as in the forest (Liberia, Kamerun, Ituri).

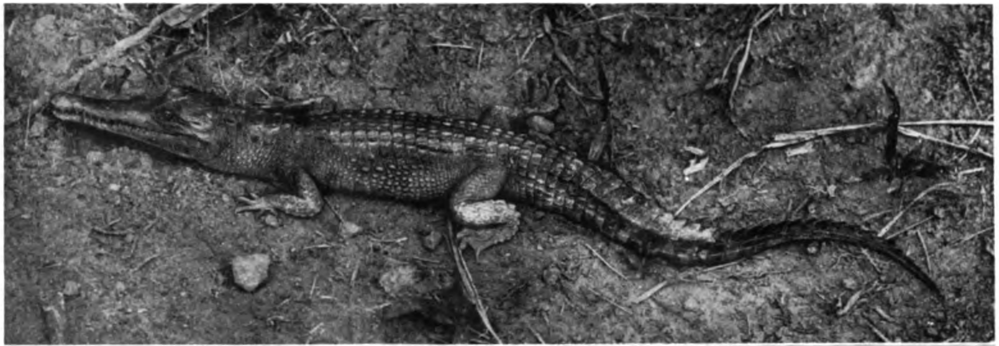
The coloration of a juvenile specimen, in life, is "Dorsally yellowish brown, with irregular dark markings, nearly black. Venter milky white from neck to anus. Iris a bronzy brownish gray." Older specimens are somewhat darker and more obscurely colored.

A. M. N. H. Nos. 10074 and 10073 had a total length, when alive, of 106 and 207 cm.; their tails measured 51 and 85 cm. respectively. Skull No. 10075 measures as follows: length, tip of snout to quadrate, 429; snout to orbit, 295; snout to pterygoid, 385; breadth at quadratojugals, 164; breadth at pterygoids, 106; breadth of snout at orbit, 88; breadth of cranial "table," 90; interorbital width, 22; depth, squamosal to pterygoid, 98 mm. Dorsal and ventral views of skull, Figs. 3 and 4, 10075, pp. 422 and 423; nuchal plates, Fig. 5, 10075, p. 424.

PLATE XII

Figure 1. *Crocodylus cataphractus* Cuvier. A. M. N. H. No. 10072; juvenile.

Figure 2. *Crocodylus niloticus* Laurenti, the common African crocodile. Photograph used by courtesy of the New York Zoölogical Society.



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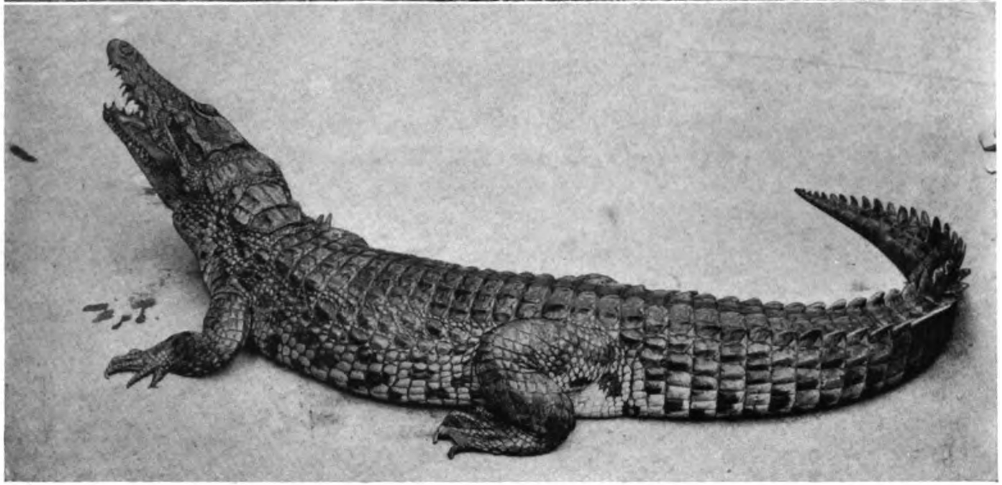

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Crocodylus niloticus Laurenti

Plate XII, Figure 2; Text Figures 3, 4, and 5

Crocodylus niloticus LAURENTI, 1768, Syn. Rept., p. 53.

Crocodilus niloticus BOULENGER, 1889, Cat. Chelon., p. 283. STEJNEGER, 1893, Proc. U. S. Nat. Mus., XVI, p. 713. BOULENGER, 1897, Proc. Zool. Soc. London, p. 800; 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 277. JOHNSTON, 1897, British Central Africa, p. 355. ANDERSON, 1898, Zool. Egypt, I, p. 10, Pl. I. BOULENGER, 1900, Proc. Zool. Soc. London, p. 447. FLOWER, 1900, Proc. Zool. Soc. London, p. 967. LAMPE, 1901, Jahrb. Nassau. Ver. Naturk., LIV, p. 197. TORNIER, 1901, Beiheft, Arch. Naturg., LXVII, p. 66. BOULENGER, 1902, in Johnston, Uganda Protectorate, p. 445. JOHNSTON, 1902, Uganda Protectorate, p. 406, Pl. TORNIER, 1902, Zool. Jahrb. (Syst.), XV, p. 664. JOHNSTON, 1906, Liberia, II, p. 816, fig. 308. SIEBENROCK, 1906, Sitzber. Akad. Wiss. Wien (math.-natur.), CXV, part 1, p. 819. JOHNSTON, 1908, George Grenfell and the Congo, II, p. 494, fig. 483. PATTERSON, 1908, Man-eaters of Tsavo, p. 151, fig. CHUBB, 1909, Proc. Zool. Soc. London, p. 592. NIEDEN, 1910, Fauna Deutschen Kol., Reihe 1, Heft 2, p. 2, fig. 3. LÖNNBERG, 1913, Svenska Vetensk. Akad. Handl., XLVII, No. 6, p. 4, figs. 1 and 2. STERNFELD, 1911, Fauna Deutschen Kol., Reihe 4, Heft 2, p. 54, fig. 54; 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 198. KLAPTOCZ, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 288. NIEDEN, 1913, Mitt. Zool. Mus. Berlin, VII, p. 54. SIEBENROCK, 1913, in Voeltzkow, Reise in Ost-Afrika, III, p. 221.

Crocodilus vulgaris CUVIER, 1810, Ann. Mus. Hist. Nat. Paris, X, p. 40, Pl. I, figs. 5, 12, Pl. II, fig. 7. BOETTGER, 1889, Ber. Senck. Ges., p. 19. BOCAGE, 1895, Herpétol. Angola, p. 8. TORNIER, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 1; 1900, Zool. Jahrb. (Syst.), XIII, p. 581; 1902, XV, p. 578.

Crocodilus robustus GRANDIDIER AND VAILLANT, 1872, C. R. Acad. Sci., LXXV, p. 150. SIEBENROCK, 1903, in Voeltzkow, Reise in Ost-Afrika, III, p. 221.

Three specimens of the common African crocodile were taken: A. M. N. H. Nos. 10079 and 10081 (April 1911 and November 1912) are from Faradje; 10080 (June 1912), Garamba.

Crocodylus niloticus ranges over the whole of Africa, except Barbary and the Sahara, and reaches Madagascar and Syria. It is well known to frequent brackish and even salt water, which may in part account for its occurrence in Madagascar. On the continent it is one of the species whose distribution appears to be little influenced by the forest. Messrs. Lang and Chapin report that these crocodiles are relatively scarce in the Dungu River.

No. 10079, when freshly killed, measured 192.5 cm., the tail length 91 cm. Skull No. 10081 measures as follows: Length, snout to quadrate, 513; snout to orbit, 316; snout to pterygoid, 449; breadth at quadratojugals, 265; breadth of pterygoids, 174; breadth of snout at orbit, 180; breadth of cranial "table," 119; interorbital width, 54 mm. Dorsal and ventral views of skull, Figs. 3 and 4, 10081, pp. 422 and 423; nuchal plates, Fig. 5, 10079, p. 424.

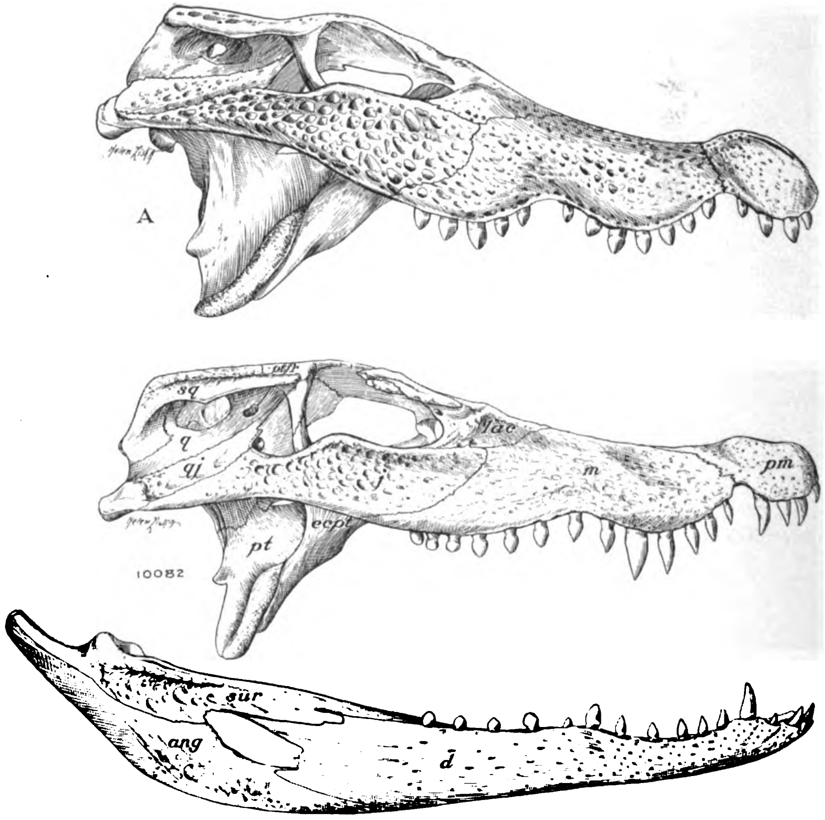

Fig. 2. Lateral views of skulls of *Osteoblepharon osborni* (type 10082, × .57) and *Osteolæmus tetraspis* (A, after Gray), and external view of the mandible of *Osteoblepharon osborni* (10082, type). Ang, angular: D, dentary; Ecpt, ectopterygoid; Fr, frontal; J, jugal; Lac, lacrimal; M, maxillary; Pm, premaxillary; Ptfr, postfrontal (? postorbital); Q, quadrate; Qj. quadratojugal; Sq, squamosal; Sur, surangular.

Osteoblepharon, new genus

Nasal bones entering the nasal aperture, not produced as a bony nasal septum. Splenial elements not entering the mandibular symphysis, which extends to the fourth tooth. Fourth mandibular tooth fitting into a notch in the upper jaw.

Teeth $\frac{17\text{-}17}{15\text{-}15}$. Ventral armour not at all ossified (?). A large bony plate, composed of two pieces, occupying nearly the whole upper eyelid. Maxillo-premaxillary suture transverse, M-shaped. Palatines narrow, with parallel sides, not produced forward beyond the anterior end of the palatal fenestra. Pterygoid produced forward to meet the palatines. Pterygoids fused, with no trace of suture. Frontal entering the supratemporal fossæ, which are small and anteriorly situated.

Intermediate between *Osteolæmus* Cope and *Crocodylus* Laurenti. Related to *Crocodylus* by the absence of the bony nasal septum. Related to *Osteolæmus* by a number of minor characters: (1) conformation and pitting of the posterior part of the skull; (2) large bony plate in eyelid, in two pieces; (3) number of teeth; (4) palatine extending no further forward than the palatal fenestra.

Distinguished from both *Crocodylus* and *Osteolæmus* by the entrance of the frontal into the supratemporal fossæ. None of the crocodile skulls accessible to the writer has the pterygoids completely fused as in the specimen of the new form.

Externally scarcely distinguished from *Osteolæmus tetraspis* Cope, except by the flatter and slenderer snout (Fig. 2).

Type, *Osteoblepharon osborni*, new species.

Osteoblepharon osborni, new species[1]

Plate XIII, Figure 1; Text Figures 2, 3, 4, and 5

?*Osteolæmus* Johnston, 1908, George Grenfell and the Congo, II, p. 929.

Three specimens of the new form from the forests of the northeastern Belgian Congo: A. M. N. H. Nos. 10082–84 (December 1913) from Niapu; a fourth, collected at Stanleyville, has not been found in the collection, but a photograph of this specimen is reproduced on Plate XIII, Fig. 1.

The record of *Osteolæmus*, cited above, by Johnston is the only evidence of its occurrence in the Upper Congo Basin; and, in view of the very close external resemblance of the present form with *Osteolæmus*, it is not improbable that the new form was the one so recorded. Pending verification, then, the range of *Osteolæmus* is to be restricted to the West African rivers south of the Sahara and west of the Congo Basin, that of *Osteoblepharon* to the northern streams of the Congo system.

Diagnostic characters

Characters of the genus.

Detailed Description

Type: A. M. N. H., No. 10082 (skin and skull).

Habitus moderately stout, head short. Length of snout from anterior border of the orbit less than one and one-half its width at that point (reciprocal proportion .70). Interorbital width contained four and one-half times in the width of the flat cranial

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[1] *Osteoblepharon osborni*.—Named in honor of Professor Henry Fairfield Osborn, President of The American Museum of Natural History.

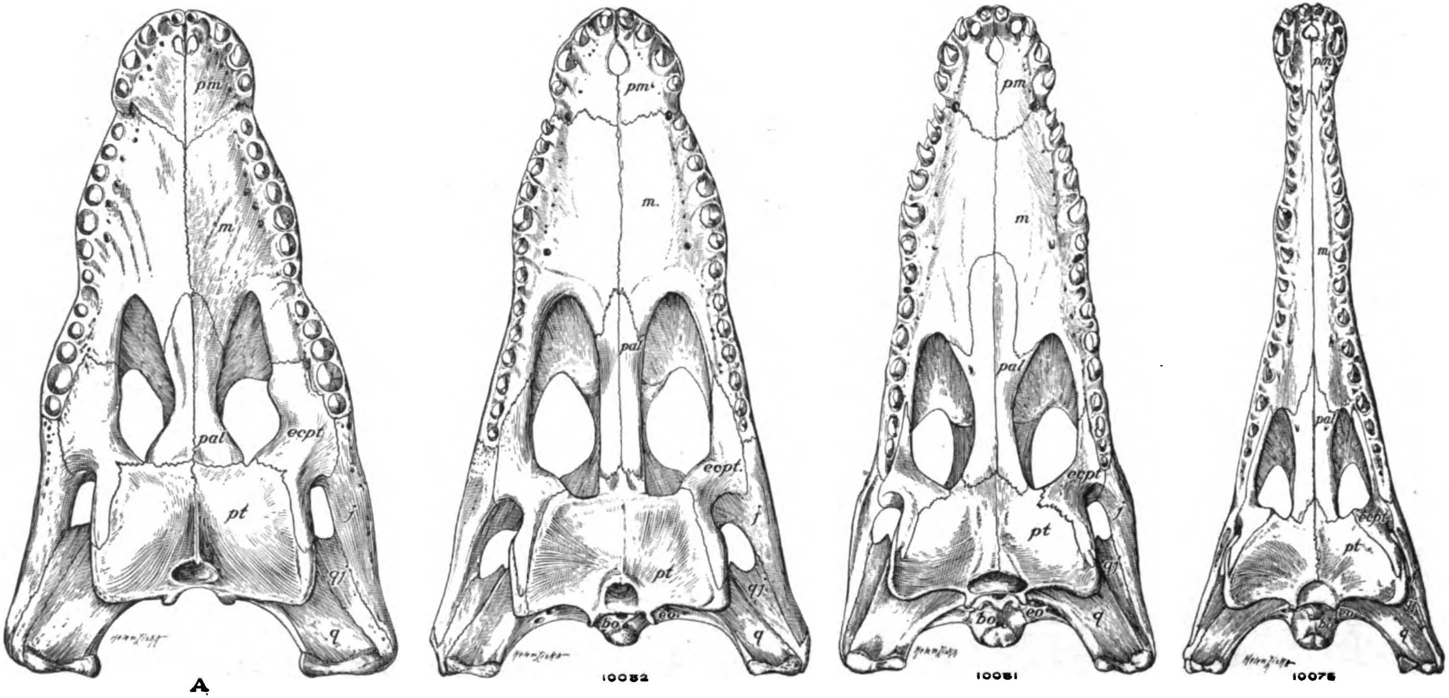


Fig. 3. Palatal views of the skulls of African crocodiles.

Crocodylus cataphractus (10075, × .21); *Crocodylus niloticus* (10081, × .18); *Osteoblepharon osborni* (10082, type, × .56); and *Osteolæmus tetraspis* (A, after Gray). Bo, basioccipital; Ecpt, ectopterygoid; Eo, exoccipital; J, jugal; M, maxillary; Pal, palatine; Pm, premaxillary; Pt, pterygoid; Q, quadrate; Qj, quadratojugal.

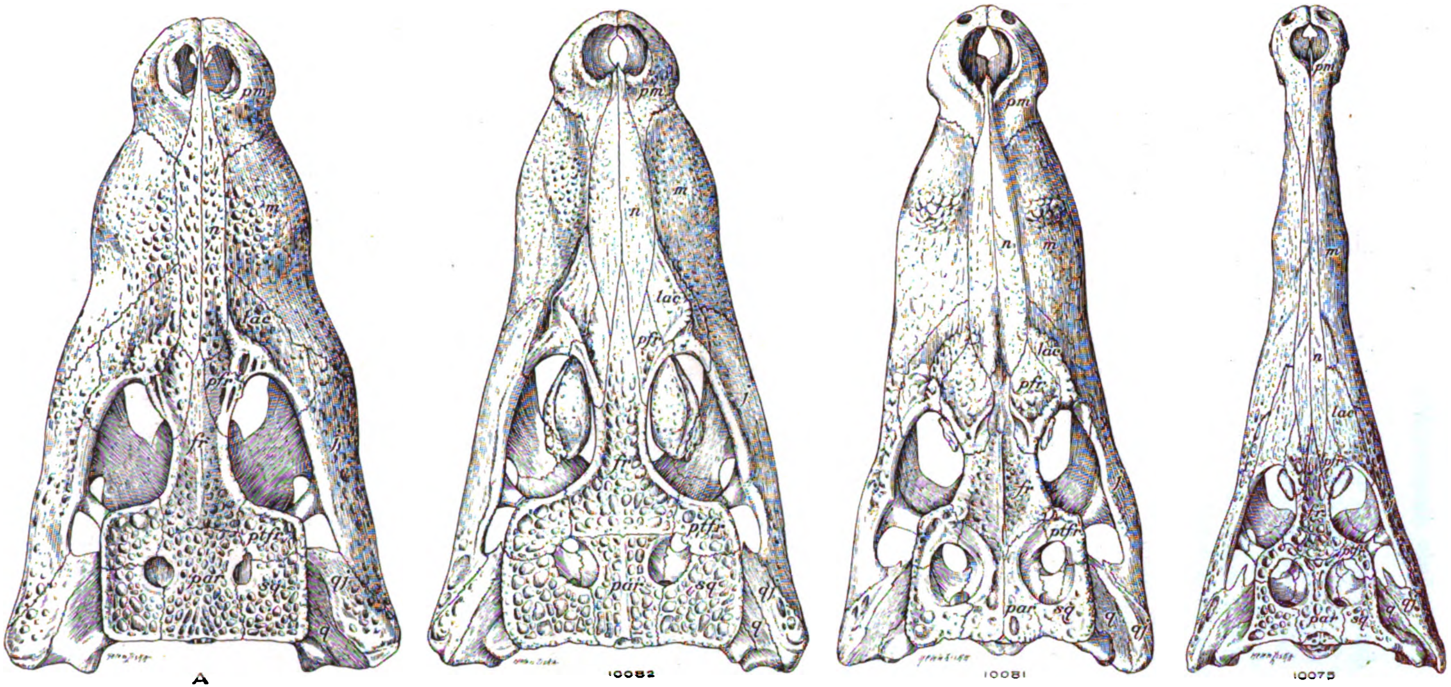


Fig. 4. Dorsal views of the skulls of African crocodiles.

Numbers as in Fig. 3. Fr, frontal; J, jugal; Lac, lacrimal; M, maxillary; N, nasal; Par, parietal; Pfr, prefrontal; Pm, premaxillary; Ptfr, postfrontal (? postorbital); Q, quadrate; Qj, quadratojugal; Sq, squamosal.

"table." A distinct laterally directed prominence before the eye. Pitting of the dorsal surface of the skull as in *Osteolæmus*, relatively fine and uniform. Externally distinguished from *Osteolæmus tetraspis* by the lateral outline of the snout, which is not anteriorly raised. Six longitudinal dorsal rows of scutes, the two median widest, with lower keels than the lateral. Transverse rows to base of tail, eighteen; the two first anterior of four scutes, ten of six scutes, followed by six of four scutes. First four transverse rows of dorsal tail shields of six scutes. A lateral longitudinal row of about five keeled plates on the sides, separated from the dorsal armour. Web between the fingers slight, well developed between the toes. No serrated fringe on the posterior border of the leg. Fourteen transverse rows of supracaudal scutes to the union of the lateral row of ventral scutes between the legs.

Anterior nuchals in two transverse rows of four each, the anterior larger, all separate and prominently keeled. The large (posterior) nuchals six, in three pairs, anterior largest, second nearly as large, third much smaller, all with strong laterally directed keel. (Fig. 5, A. M. N. H. No. 10082).

Measurements of the skull of the type, No. 10082: length, snout to articular, 190; length, snout to quadrate, 169; length, snout to pterygoid, 142; snout to anterior border of orbit, 90; greatest breadth (at quadratojugals), 92; breadth of cranial "table," 59; interorbital breadth, 12; greatest depth, pterygoid to squamosal, 63 mm.

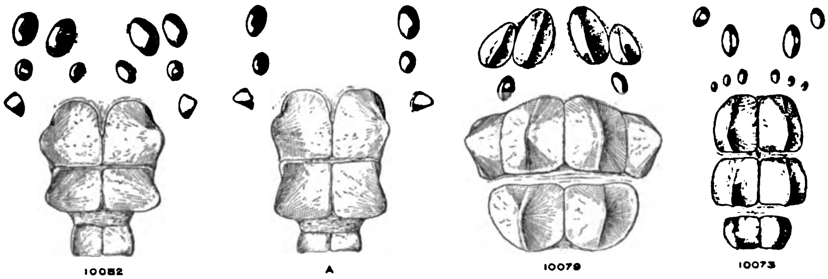


Fig. 5. Nuchal scutes of African crocodiles.

Osteoblepharon osborni (10082); *Osteolæmus tetraspis* (A, from living specimen, N. Y. Zool. Soc.); *Crocodylus niloticus* (10079); *Crocodylus cataphractus* (10073).

The paratypes, one slightly larger, the second a juvenile specimen, show very little variation. The number of supracaudals, 14 + 17 in the type, is 12 + 18 in the smaller, 13 + 12 in the larger of the paratypes.

The color of all three is very dark, probably similar to *Osteolæmus*.

The stomach contents of A. M. N. H. No. 10082 consisted chiefly of river crabs.

To facilitate comparison of the new form, figures of the skulls of the four African crocodilians are presented (Figs. 3 and 4) and the lateral views of *Osteolæmus* and *Osteoblepharon* with its mandible (Fig. 2). The figures of *Osteolæmus tetraspis* are after Gray, 1869, Trans. Zool. Soc. London, VI, Pl. xxxi, figs. 4, 5, and 6. For the comparison of external characters, the photographs of *Osteoblepharon* and *Crocodylus cataphractus* taken by Mr. Lang have been supplemented with photographs of living *Osteolæmus* and *Crocodylus niloticus*, through the courtesy of the New York Zoological Society.

Measurements of freshly killed specimens

A. M. N. H. No.	Total Length	Body	Tail
10082	1145 mm.	600 mm.	545 mm.
10083	1240	690	550
10084	655	340	315
(Field No. 139)	1300	690	610

Ecological Notes on Congo Crocodiles

The following observations are contributed by Mr. Herbert Lang.

The discovery of a new species of crocodile, *Osteoblepharon osborni*, in the interior of the Congo Basin, and the paucity of records of specimens actually identified from these regions reveal the lack of careful study of these huge reptiles in that large and interesting territory. For more than six years, while traveling in the Belgian Congo as far as the Congo-Nile divide, I had a great opportunity to gather data bearing on the ecology of crocodiles. They are distinctly scarce in all parts of the Congo visited, especially when compared with the numbers recorded from the Nile, the Zambesi, the rivers of Upper Guinea, or even as small a stream as the Tana River in East Africa. On the trip up the main river of the Congo Basin to Stanleyville it is an extraordinary event to see half a dozen at one time; two or three may be sighted together, but even single specimens are scarce. It is, of course, impossible to ascertain to what species the crocodiles thus observed belong, and these notes are written in the hope of encouraging observations based on collected material and correctly identified specimens.

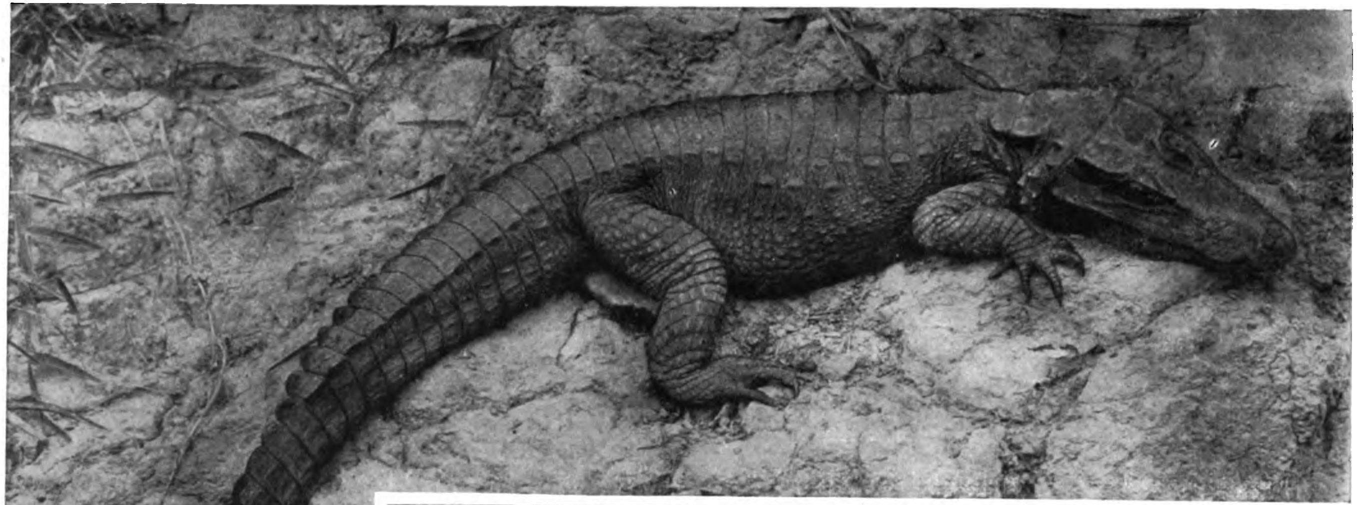
In relatively recent times man has exterminated crocodiles from a large part of South and North Africa, although a few Nile crocodiles still survive in Syria. At present not many will venture beyond Khartum, Lake Chad, and the Senegal in the north, and they seldom enter the regions south of the Kunene, the Kalahari, and the Tugela.

The tropical and subtropical climate and the general physiographical conditions have placed few obstacles in the way of their dispersal throughout Africa and, in their present range, there is practically no body of water that at one time was not, or may not become again, their home. Lake Kivu, so far as known, is one of the exceptions, for no crocodiles have been recorded there. Its mountainous surroundings, an altitude of 1460 m., and a cor-

PLATE XIII

Figure 1. *Osteoblepharon osborni,* new species. Total length 130 cm.

Figure 2. *Osteolæmus tetraspis* Cope. Total length 142 cm. Photograph by courtesy of the New York Zoölogical Society.



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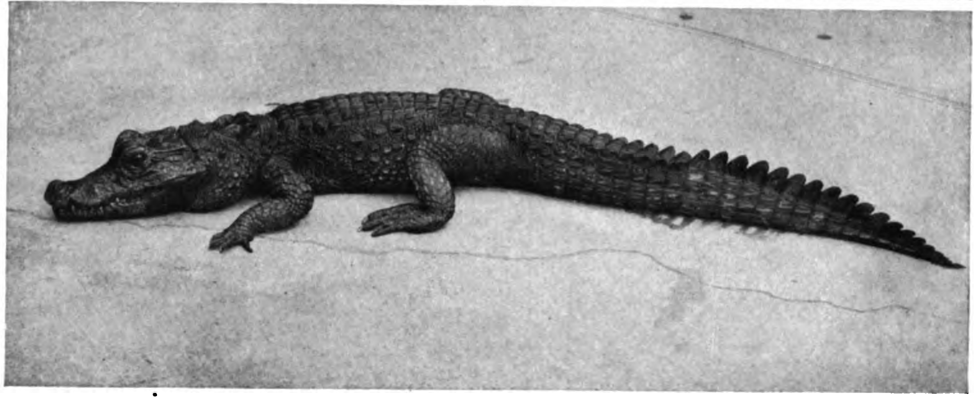

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respondingly low temperature may account for their absence; but why Lake Albert Edward, at an altitude of only 914 m., should not be visited is difficult to understand, especially as the outflowing Semliki is one of their favorite sporting grounds.

That the ecological conditions in the Western Forest Province and the more humid portions of the Sudanese Subprovince are by far more favorable than elsewhere in Africa is demonstrated by the presence of all four Ethiopian species, *Crocodilus niloticus, C. cataphractus, Osteoblepharon osborni* and *Osteolæmus tetraspis,* the latter three being the typical West African forms. Furthermore, the Nile crocodile is the only form recorded from any other part of Ethiopia.

The following short résumé of the hydrographic conditions influencing the dispersal of crocodiles in the Belgian Congo will shed some light on the problems involved. From geological evidence we know that the great, roughly square basin with only slight, peripheral elevations, was formerly a flat lake bottom, which was drained into the Atlantic through a cleft in the Crystal Mountains. The river system subsequently formed has dug innumerable shallow beds producing one of the best-watered tropical regions in the world, and its wide and tranquil stretches are elements that make it apparently the most ideal for crocodiles, especially as rapids and swifter currents are confined to short sections. This enormous river-system, with an estimated length of 3000 miles, drains an area of about 1,450,000 square miles and is second in volume only to the Amazon. Of the large bodies of water it is unparalleled in not receiving a single affluent from glaciers and in its fairly even spread to both sides of the equator. Indeed, the headwaters of the Congo, more or less intermittent and at times torrential, reach to 8° N. and 13° 30′ S. and exercise considerable influence on the life history of crocodiles, for a few degrees north of the equator the seasons are the reverse of those the same distance south. The southern affluents, including the sources of the Congo, are hydrographically by far the most important, for in April and May they may cause a rise of from twenty to twenty-five feet in the Lower Congo, at Matadi; but in October those in the north flood the central section of the main river just in time to prevent the drying out of many sand-covered banks or islands, a condition requisite for the breeding sites of the Nile crocodile.

It is surprising that *C. niloticus,* eminently adapted to regions with well regulated dry and wet seasons, should occur in the humid equatorial area of the Rain Forest. This would seem to prove that the Nile crocodile is hardier and more adaptable than other forms, but there is no obstacle to its dispersal along the regular waterways, its eggs hatching in any region with a dry season of at least two months, that is, in all sections bordering the Congo or its affluents three degrees north or south of the equator. Through generalization from the well-known life history of this species it has been maintained that sunny basking places are a necessity to the welfare of all African crocodiles. In the low-lying equatorial zone, however, excessive heat and moisture have fostered an uninterrupted and luxuriant forest from the Atlantic 1800 miles inland, covering most of the river banks as well as thousands of islands and extending as forest galleries along many of the affluents far out into the savannah. Dry, sunny places are therefore not numerous, which may partly account for the scarcity of crocodiles here, although this is perhaps of only secondary importance to the typical West African species, whose breeding habits are adapted to the moisture of the Rain Forest and of the large Guinean estuaries. Unlike the Nile crocodile, the hatching of their eggs is not dependent on an extended dry season.

It has long been known that *C. cataphractus* builds a nest of dead vegetable matter and the same was observed of *O. osborni*. About the nesting habits of *O. tetraspis* I could secure no definite information, although I am inclined to believe the native statement that they, too, deposit their eggs in mounds pushed together from what can be found near the ground. It is doubtless the females that scratch together the dead leaves and other vegetable matter in which the eggs are imbedded; the hatching is abandoned to the heat of fermentation, which also equalizes the cooling effect of occasional rains. Of importance is the selection of a place in inundated areas so swampy that termites, which are the rapid transforming agency of dead vegetable matter into humus, are barred therefrom and cannot effect this process. Such a practice can have been evolved only in a forest country and the distribution of other animals would indicate that these forest crocodiles formerly had a much wider range and only became less extended with the gradual deforestation and drying up of Africa. Owing to the general scarcity of paleontological data in most regions of Africa, it is, however, impossible to furnish conclusive proof.

The lone occurrence of crocodiles in Congo waters, in contrast with their gregariousness in other regions, makes a clearer conception of their individual habits possible. The tendency to remain stationary during certain hours of the day is well known and single crocodiles especially are apt to appear at a place very regularly, a habit traceable to their liking for basking when the heat is greatest, and special excursions are made for this purpose. They may remain for months in a locality where food is abundant, but difficulties arise at the height of the rainy season when the fish, their principal food, are also more widely scattered by the periodical inundation. In the dry season they return to the larger streams, but a few are stranded in water-holes; although some undertake long journeys by land, others are credited with enduring excessively dry periods by estivating several months in the dried-out ground.

In the northwestern Belgian Congo we found the Nile system connected with that of the Congo during the rainy season. At the end of July 1912 a large swamp near Garamba, then sufficiently flooded, allowed the passage of fishes from the headwaters of the Nile, through the Tore, to those of the Congo. A similar junction of the Tondji (Nile) and the Aka (Congo) was observed in October 1911. In this connection it is interesting to note that the Congo has 21 fishes in common with the Nile, 47 with the Niger, 25 with the Zambesi, and 29 with the Chiloango, proving, if not a present, at least a relatively recent, inter-relationship of all these river-systems. The raptorial tendency in crocodiles is strong enough to overcome reptilian sluggishness and is partly responsible for their wide distribution, exercising on them the same influence as on other predatory forms. Among fishes, the African characins may be cited as an example, and the most voracious of all, the "water-leopard" *Hydrocyon*, shows the widest distribution; among semi-aquatic mammals, the clawless otter *Aonyx*, and, within the Congo, the fish and crab-eating insectivore, *Potamogale*.

In general, it is difficult to discover crocodiles in the brownish waters of the Congo, for the forested shores, driftwood, and half-submerged boulders help conceal the small portion of the head carried above the surface; and the animal floats in silence. Snapping the jaws, hissing, and croaking are with them, as with the Felidæ, merely the expression of momentary emotion, especially in captivity. The loud intermittent bellowing of large solitary specimens may be correctly interpreted as the most forceful expression by which a sluggish reptilian communicates to great distances the longing for companionship. Though I never had conclusive proof that females were not endowed with so strong a vocal organ, in several instances bullets snuffed out the lives of actual performers and they proved to be males. At Faradje in October, a large solitary crocodile regularly announced its presence late in the afternoon by a series of intermittent bellowing sounds, and a few weeks later was joined by two others. Although at first we thought the cause of the noise might have been a hippopotamus, none had been seen in that region for the last ten years; an old lion was next suggested, but the true source was finally discovered, a crocodile that abandoned itself to the current and could hardly be distinguished from the many emerging rocks of granite.

No small amount of traveling must be done by crocodiles under the influence of sexual attraction, and two pairs of large odoriferous musk glands probably have the sole purpose of aiding this instinct by making the trail easy to follow. The two gular pouches on the inner sides of the mandible and the large excretory organ on either side of the longitudinal cloacal slit are practically always in contact with the surface upon which the crocodiles rest, imparting to these places a strong peculiar stench, and undoubtedly the whiffs carried off are a sure indication of their whereabouts to others of their kind, although they themselves remain unseen. Their sense of smell is so keen as to need the assistance of neither eyesight nor hearing and, judging from the behavior of crocodiles in localities where they have learned to fear man and his firearms, one soon finds that it is not merely the need of fresh air that prompts them to let only the nostrils emerge, but really their wariness.

In their struggles captives sometimes turn out the pockets near the chin and discharge through the cloacal opening an ill smelling fluid, showing, thereby, readiness to respond to reflexes causing excitement. It is not likely that these glands are used as a means of defense, for that is naturally left to the powerful, lacerating jaws and the forceful, well directed blows of the muscular heavily-armored tail. Young specimens play dead and sometimes secure freedom by suddenly rushing off. With legs well straightened and body and tail carried high from the ground, they run surprisingly fast, even through undergrowth dense enough to halt a man and where they often come to a sudden stop, which makes pursuit difficult and dangerous. Besides man, the greatest enemy of crocodiles is the Nile Monitor (*Varanus niloticus*), which, however, destroys only their eggs, a feat also accredited to a mongoose. In a specimen of *C. cataphractus* large numbers of leeches fastened around the cloacal slit and to the folds about the fore and hind limbs surely must have produced great inconvenience though they would never have caused death. Their intestines are singularly free from parasitic worms, due perhaps to the presence in the stomach of large stones that help crush even the bones softened by the strong digestive action undergone in the peculiar gullet.

Observations by Mr. R. L. Ditmars, curator of reptiles at The New York Zoological Park, show that in the common alligator (*Alligator mississippiensis*), attaining a maximum length of sixteen feet, the young at birth measure eight inches and weigh one and three-quarter ounces, and in the twelfth year reach nine feet three inches and weigh one hundred and ninety pounds. From the experiences of Stevenson-Hamilton (1912, Animal Life in Africa, p. 305), it appears that the rate of growth of the Nile crocodile is approximately the same up to the fourth year, that is, about one foot a year. According to Boulenger, alligators are considered sexually mature in about the eighth year, but no observations alone this line on the Nile crocodile are available.

The long-snouted crocodile, *C. cataphractus* (Plate XII, Fig. 1), attaining a length of about 12 feet, exceeds in size the other West African forms, *Osteolæmus* and *Osteoblepharon*, and is without doubt the predominant species in its habitat, occurring even in brackish water. Like the gavial of India, it represents the ideal fishing type, for the elongated snout not only stirs the fish below boulders in quieter stretches but also is easily inserted into the cavities and among roots and overhanging branches of the generally forested banks.

In view of the fact that during the last 30 years sleeping sickness has considerably decreased the number of natives in the Lower Congo, especially about the estuary, one might think that, with the principal enemy removed, crocodiles would be more numerous than ever. In addition, fish entering from the sea offer here a more abundant food supply than in any other region of the Congo I have seen. Yet, during three months of collecting in the creeks near Banana, Malela, Kunga, Moanda, Bulabemba and St. Antonio, only eleven specimens were observed, although canoe trips brought me many times to the forests of mangroves and Raphia swamps where they would naturally occur. None were found on the islands, neither on those covered with vegetation nor those resembling sandbanks or mud-flats. Those observed were lying singly in the shade near the shore, several feet above the water-level, and either ran farther into the swamps, or, as more often happened, plunged into the river. On these occasions the natives had no fear of them but at other times would not ford a creek in which they were known to occur.

Neither the Nile crocodile nor *Osteolæmus tetraspis* (Plate XIII, Fig. 2) was observed in the Lower Congo, although Pechuel-Loesche reports the latter there and natives spoke of a short-snouted species with the same breeding habits as *C. cataphractus*. Definite evidence on this point would be desirable.

The results of our collecting show that the range of *C. cataphractus* extends into the savannah as far to the northeast as Faradje, but its presence there is no more difficult to explain than that of *C. niloticus* in regions without sandbanks or other places dry enough for breeding purposes. Forest galleries along the Uele-Dungu River, its affluents, and most other streams offer suitable nesting places, accounting for the presence of *C. cataphractus* beyond the Congo-Nile divide; records from Ujiji and Togo may be traced to similar conditions and it is likely to be found in the Semliki also.

It is generally assumed that wherever established, crocodiles occur in numbers, and the many eggs in one set would partly justify such an idea, but in the inhabited areas, which in the Congo the crocodiles prefer, such broods are rapidly decimated. The difficulty the young experience in finding food at the time when ample nourishment is probably much desired was illustrated by the numbers, not yet a foot in length, the natives caught in their fish traps. They force their way into eel-pots so small that only part of the body can enter and are naturally drowned.

Stomach contents prove that they feed on anything they can find; shrimps (Palæmonidæ), crabs (Thelphusidæ), batrachians, water-snakes, fish and even grasshoppers had been eaten by young *C. cataphractus*.

The Nile crocodile, *C. niloticus* (Plate XII, Fig. 2), probably never more than 16 feet in length, proves to be the most widely distributed species, is more common outside the forest region, and is, as a rule, less timid than the typically West African forms.

On a sandy island in the Dungu River near Faradje, at the end of February, we came across a nest nearly 2 feet above water-level, and the 32 fresh eggs were covered with only 10 inches of dry sand. From other African regions come records of sets of from 20 to 90, either imbedded in one and a half feet of sand or humus or else so close to the surface as to be exposed. A. Voeltzkow, who made many interesting observations on crocodiles in Madagascar, has stated that the noise made by the mother coming to watch her nest induces the young, ready to emerge, to make a hiccup-like sound that indicates to her the proper moment for scraping from the eggs the layer of sand nearly 20 inches deep, thus helping them to hatch, after which the brood is led to the water. He also says that freshly laid eggs are extremely sensitive to moisture, probably the cause of the difference in breeding seasons in the various districts. The need for perfectly dry nesting sites prevents the Nile crocodile from gaining a foothold in the equatorial portion of the Congo where, unable to breed, it must be considered an immigrant from the northern and southern affluents.

Osteoblepharon osborni (Plate XIII, Fig. 1) is a small forest crocodile, probably never more than five feet in length, and, while resembling the short-snouted *Osteolæmus tetraspis* so greatly that in the field we considered it such, differs from it externally by its less elevated nasal region and the anterior set of dorsal scutes (Fig. 5, No. 10082); the important generic and specific characteristics can only be seen in the skull (p. 422). The largest specimen, measuring 3 feet 9 inches in total length, was caught by the Lukele near Stanleyville, 1200 miles inland, in the low-lying forests on the left bank of the Congo River; the other 3 specimens came from the Bima River (Uele) and its affluents near Niapu.

Probably the many small brooks in the Rain Forest throughout the interior of the Congo Basin are the haunts of this newly described form. Its range would therefore extend from the region of the Cataracts (Stanley Pool) to the valleys bordering the Ruwenzori. *C. cataphractus* should be considered typical of the larger rivers, whereas *Osteolæmus tetraspis,* as Mr. Schmidt suggests, would be the estuarine Guinean form, since its greatly elevated nasal region may allow it to keep floating in the choppy water in part of its habitat.

My frequent excursions along the Bima River near Niapu during January and February 1914 enabled me to become better acquainted with the habits of *O. osborni.* Here it is the principal form and usually occurs singly, is extremely timid, and loves to frequent the more extended shallow portions of the river bordered with swamps. From stomach contents it is clear that fish are the principal food. During the dry season, lasting nearly three months in 1914, from December to the end of February, few islands and even fewer sandbanks were visible, but many of the brooks had been reduced to large, scattered, muddy pools. At the beginning of the dry season, when the water-level is rapidly sinking, the Makere erect barriers containing huge eel-pots from which the fish are taken as fast as they arrive. In several villages natives were busy day and night for about a month and incidentally caught a dozen or so of these crocodiles. On a high, rocky point, completely surrounded by almost impenetrable Raphia swamps, I also saw a freshly looted nest near which a native had killed a large specimen. In a natural hollow a heap of dead vegetable matter, not more than 5 feet across and somewhat higher in the center, had evidently been pushed together with a sweep of the tail. Another old nest looked more like a quantity of accidentally heaped detritus, but a few fragments of egg-shell clearly proved the contrary.

The oft recurring accounts of large numbers of crocodiles in the Congo and their depredations are probably based on the information of natives, which is always exaggerated in direct proportion to the interest shown by the questioner. To this source can be traced the gruesome tales of man-eating crocodiles that terrified whole regions, which were delivered by a hero usually chosen at the narrator's fancy. Though ordinary precautions are taken, it is an error to think that the average Congo native, whose cannibalistic inclinations alone stamp him a warrior, could be terrified by crocodiles lingering for a while in the waters near the village, nor is his intelligence of such low order that he would suffer injury without thinking of a preventive. As a rule semicircular palisades are erected in the river near villages where crocodiles occur, providing places of safety for purposes of bathing or securing water. Then, too, each neighborhood has its hunters and fishermen, and few crocodiles could long escape the many traps, which are as cleverly adapted to the different animals as to the surroundings.

The most widely favored method of capturing them is with a hardwood stick, pointed at both ends and baited with fish or meat, and fastened to a rope in the middle. When swallowed, the stick sets itself across the body, lacerating the internal organs at every pull of the struggling and infuriated beast. Or they may be crushed in traps set near the shore by the descent of a log released as they attempt to steal the bait. The natives also show exceptional cleverness in arranging nooses, sometimes as many as three, in which the crocodiles are caught as they endeavor to secure some living, but well-protected, bait.

In native superstition crocodiles play an important rôle and there is a general belief that persons with powers of witchcraft can enter into an agreement with them and incite them to attack their unfortunate victims. This was the case with the Logo near Faradje. I was told that the Nilotic peoples near Lado, where the Nile is over 800 feet in width, daily cross in safety on rafts made of dried papyrus stalks, with their legs dangling into the water. In many tribes, such as the Mangbetu, Azande and the Logo, they become the totem of individuals, who then need not fear attack and cannot be induced to kill nor eat them, though the meat is generally highly prized. The Mangbetu at Niangara save the claws, which are worn as talismans and are said to remove all danger from injury by crocodiles, and the large teeth become pendants, and are supposed to confer powers of tenacity; stones found in the stomach and often three inches in length are used by natives of the Ituri as an aid to sorcery.

Discarding all rumors, our inquiries of officials who had resided ten years or more in the Congo failed to bring to light a dozen actual cases, and I can furnish no better proof of the scarcity of accidents from this cause than the fact that the Congo Expedition, during six years, employed over 38,000 porters and had dealings with several hundred thousand natives, and yet in all that time not one authentic case of loss of human life due to crocodiles came to our notice. Death caused by poisonous snakes is equally rare, but in the Congo leopards are responsible for more fatalities than either crocodiles or snakes. An Azande chief, in traversing a papyrus swamp near Faradje on one of the open, and often deep, elephant crossings, also used by other game, was attacked by a crocodile, which when poked with spears freed its prospective victim, having inflicted no greater damage than about twenty scratches, only a few of them deep. In another instance, cattle crossing the Dungu River at Faradje were pestered by a large crocodile which wounded a few, clipping off the tail of a cow; a similar case was observed by Dr. J. Bequaert in the Manyema.

It is worth mentioning that in the forest in the course of a day's march, 15 or 20 miles, one comes to twenty or even forty watercourses, mostly unimportant, and only the larger ones are crossed with rafts or canoes. In the savannah, half a dozen or more brooks or swamps are traversed daily, even in the dry season, and porters bathe therein without fear and when in pursuit of game seldom hesitate to enter.

In all probability the number of crocodiles has never been great in the Congo Basin, for the food supply is decidedly limited. Fish are relatively scarce, although represented by an enormous variety, some 750 species being known at present. In the forest region, large herds of game frequenting streams are unknown, and in the northeastern Uele, troops of cob or waterbuck seldom exceed a dozen or two and other animals are still scarcer; the general lack of flocks of large aquatic birds in this enormous river system is a great surprise. In certain districts of the Katanga, however, game is more abundant and Dr. J. Bequaert, who traveled for four years in the Congo, informed me that in one instance he saw as many as twenty crocodiles at Kasenga, on the sandbanks of the Luapula River, where colonies of water birds are also more common.

SQUAMATA

LACERTILIA

GECKONIDÆ

Key to the Genera of Geckonidæ Known from the Rain Forest

A. Digits straight, not dilated........................*Stenodactylus.*
(An Egyptian form (*S. elegans*), the single Kamerun record possibly accidental; more probably the range extends via the Lake Chad area and the Egyptian Sudan; in any case, accidental in the Rain Forest.)
AA. Digits angularly bent, not or only slightly widened at the base.
  B. Pupil round; toes once angularly bent. Ituri......*Gonatodes.*
  BB. Pupil round; toes twice angularly bent. Kamerun. *Ancylodactylus.*
AAA. Digits dilated.
  B. Dilation distal, the apex of the digit having two plates inferiorly, separated by a longitudinal groove.
    C. Scales of dorsal surface of digital expansion uniform with those of the undilated basal part............*Diplodactylus.*
    CC. Scales above digital expansion heterogeneous. *Phyllodactylus.*

BB. Digits dilated, the distal phalanges compressed.
  C. Distal compressed joint long, arising within the extremity of the dilated portion; subdigital lamellæ in two series; inner digit well-developed........................*Hemidactylus.*
  CC. Distal compressed joint very short, rising from the extremity of the dilation; digits not dilated basally; inner digit much reduced; tail-tip with adhesive lamellæ inferiorly. *Lygodactylus.*

Gonatodes Fitzinger

Synopsis of the African Species of *Gonatodes*

A. (?) Subdigital lamellæ of the angulate distal part of the digits, uniform, transverse.
(Asiatic and American species)
AA. (?) Subdigital lamellæ of the angulate part of the digits heterogeneous, transverse distally, broken up proximally.
  B. Ten to fourteen longitudinal rows of dorsal tubercles, no tubercles on the tail..*africanus.*
  BB. Four rows of tubercles or less.
    C. Four rows of tubercles on the tail..........*quattuorseriatus.*
    CC. Tail without tubercles........................*dickersoni.*

Gonatodes dickersoni, new species[1]

Text Figure 6; Map 4

Two specimens represent an undescribed form from the Ituri region: A. M. N. H. Nos. 10101 (April 1914) and 10102 (May–June 1914) are from Medje.

The discovery of a species of *Gonatodes* in East Africa (Werner, 1895, Verh. Zool.-Bot. Ges. Wien, XLV, p. 190) was an interesting event in African herpetology. To the original *Gonatodes africanus,* Sternfeld has recently added a second very distinct species, *Gonatodes quattuorseriatus,* from the lake region (1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exped., IV, p. 202). The present form, which is more closely related to the latter, extends the African range of the genus far to the northwest and adds a distinctly East African species to the Ituri fauna, confirming still further the endemic nature of *Gonatodes* in Africa.

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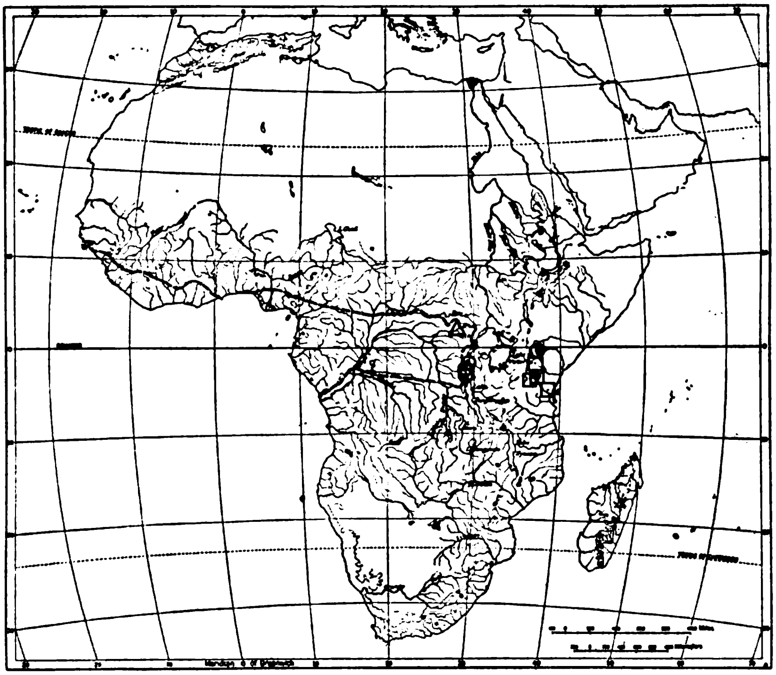
[1] Named in honor of Miss Mary Cynthia Dickerson, Associate Curator of Herpetology in The American Museum of Natural History.



Map 4. Distribution of *Gonatodes* in Africa.

□ *Gonatodes africanus*.
○ *Gonatodes quattuorseriatus*.
△ *Gonatodes dickersoni*. An eastern element in the fauna of the Ituri Forest.

The distribution of these three species presents some peculiarities. *Gonatodes africanus* is well known from Usambara and the Kilimanjaro. Mocquard (1902, Bull. Mus. Hist. Nat. Paris, VIII, p. 405) records it from the Athi Plain, British East Africa. The record from Mt. Kenia (Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 10) has been transferred to *Gonatodes quattuorseriatus* by Nieden (1913, Mitt. Zool. Mus. Berlin, VII, p. 64). This species occurs in the lake region from the northern end of Lake Tanganyika to the borders of Lake Kivu. The species here described comes from the Ituri, within the limits of the continuous Rain Forest. The accompanying map illustrates this somewhat anomalous distribution.

Diagnostic characters

Closely allied to *quattuorseriatus* Sternfeld, with very similar color pattern, differing in (1) more slender habitus; (2) absence of the tubercles on the tail; (3) lateral tubercles conic or high conic, instead of flat, nail-shaped; (4) only one row of tubercles on each side, the four, posterior, dorsal tubercles not paired with the lateral; (5) larger ventral scales, three times the size of the dorsal tubercles.

Detailed Description

Type: A. M. N. H., No. 10101, ♂.

Habitus more slender, neck more elongate and narrowed than in *quattuorseriatus*, the snout equalling or slightly exceeding the distance between eye and ear, slightly more than twice the diameter of the eye. Tail much enlarged at base, with a large conical tubercle on each side beneath, tapering regularly for the remainder of its length, exceeding the body length. Limbs and digits slender, the latter strongly angulate distally. Eye with round pupil.

Rostral broader than high, with distinct median cleft above. Nostril bordered by the rostral, the first labial, two small posterior and a large superior nasal, the latter meeting its fellow on the other side, and appearing as if cut off from the cleft portion of the rostral. Labials 5–6 above, and 5–5 below. Mental large, triangular, followed by a pair of large postmentals, which are separated by two small median postmentals in the type, by one in the paratype. Granular scales on the snout larger than those of the back of the head.

The ventral scales are rather large, three times the size of the dorsal tubercles, smooth and imbricate, 20 or 22 in a transverse series. The dorsal granules are small, with a row of conical tubercles on each side, 5 to 7 between arm and leg, and several above the swollen portion of the base of the tail, these flat and nail-like. Four tubercles posteriorly on the back, not paired with the lateral. No tubercles on the tail, which is covered above with small, smooth, slightly imbricate scales, larger on the sides, and below with a median row of transverse scales enlarged to about one-third the width of the tail.

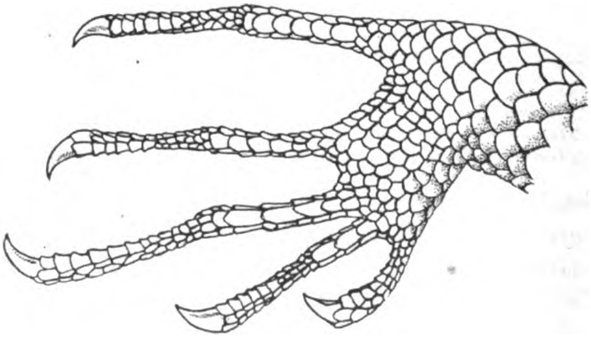


Fig. 6. Plantar view of foot of *Gonalodes dickersoni* (type, 10101, × 8). To show heterogeneity of subdigital scales of the distal part of the toes.

Color pattern as illustrated by Sternfeld (1912, Pl. VI, fig. 1) but less distinct. A fairly distinct horseshoe-shaped dark band from eye to eye over the occiput, bordered behind by a lighter band, and dark marks from eye to eye and from eye to nostril. The colors in life are pale gray on the throat and venter, lower side of tail pinkish; gray above with light brown triangular dorsal markings, 6 on the tail, 8 on the body.

There are enlarged subdigital plates on the proximal straight portion of the toes and fingers. The outer half of the distal curved part is covered below with transverse scales, while the inner half, to the angle, is covered with small elongate scales, scarcely in pairs. (Fig. 6). The non-African species of *Gonatodes* which have been accessible to the writer have uniform subdigitals on the distal part of the digits, (cf. also Boulenger, 1885, Cat. Lizards, I, Pls. V and VI) and it seems possible, as the other African species have not been explicitly described in this respect, that this character may prove distinctive of the African members of the genus.

Measurements and Scale Characters

A. M. N. H.	No. 10101, ♂	No. 10102, ♂
Anal Pores	8	7
Length	78 mm.	
Body	34	31 mm.
Tail	44 mm.	
Tail/Length	.56	
Axilla to Groin	18	16 mm.
Snout to Arm	14	13 mm.
Arm	12	11 mm.
Leg	17	16 mm.
Head Length	9	8 mm.
Head Breadth	6.5	6 mm.
Snout	3.5	3.7 mm.
Eye	1.5	1.5 mm.
Imbricate Ventrals, Transversely	22	20
Labials	$\frac{5-6}{5-5}$	$\frac{5-5}{5-5}$

Hemidactylus Cuvier

Artificial Key to the Species of *Hemidactylus* Known to Occur in the Rain Forest

A. Digits webbed at base.

  B. A lateral fold; tail laterally denticulate.

    C. Femoral pores none, preanal pores 8. . . . . *echinus.*

    CC. 21–24 femoral pores on each side. . . . . *richardsoni.*

  BB. No lateral fold, tail round, without tubercles.

    C. Subdigital lamellæ 8–10. . . . . *fasciatus.*

    CC. “ “ 10–13 . . . . *ituriensis.*

AA. Digits not webbed at base.

  B. Subcaudal scales transversely enlarged, dorsal tubercles rounded, femoral pores continuous. . . . . *mabouia.*

BB. Subcaudals enlarged, irregular, keeled dorsal tubercles in 8 rows. *ansorgii.*
BBB. Subcaudals small. Dorsal tubercles keeled, in more than 8 rows.
  C. No lateral fold............................*longicephalus.*
  CC. Lateral fold present, or at least a row of lateroventral tubercles.
    D. Tubercles small, sharp pointed, weakly keeled. *muriceus.*
    DD. Tubercles larger, keeled...............*steindachneri.*

Hemidactylus mabouia (Moreau de Jonnès)

Map 5

Gecko mabouia Moreau de Jonnès, 1818, Bull. Soc. Philom. Paris, p. 138.

Hemidactylus mabouia Bianconi, 1850, Spec. Zool. Mossambicana, p. 21, Pl. i, fig. 1. Boettger, 1879, Abh. Senck. Ges., XI, p. 478, Pl. xxv, figs. 9–16; 1881, XII, p. 467. Peters, Reise nach Mossambique, III, p. 27, Pl. v, fig. 3. Boulenger, 1885, Cat. Lizards, I, p. 122. Mocquard, 1887, Bull. Soc. Philom. Paris, (7) XI, p. 133. Strauch, 1887, Mém. Acad. Sci. St. Pétersbourg, (7) XXXV, p. 31. Mocquard, 1888, Mém. Cent. Soc. Philom. Paris, p. 112. Boulenger, 1891, Proc. Zool. Soc. London, p. 306; 1891, Ann. Mus. Stor. Nat. Genova, (2) XII, p. 6. Pfeffer, 1892, Jahrb. Hamburg. Wiss. Anst., X, p. 72. Günther, 1893, Proc. Zool. Soc. London, p. 618. Stejneger, 1893, Proc. U. S. Nat. Mus., XVI, p. 714. Günther, 1894, Proc. Zool. Soc. London, p. 85. Bocage, 1895, Herpétol. Angola, p. 10. Jeude, 1895, Notes Leyden Mus., XVI, p. 227. Werner, 1895, Verh. Zool.-Bot. Ges. Wien, XLV, p. 191. Boulenger, 1896, Ann. Mus. Stor. Nat. Genova, (2) XVI, p. 550; 1896, (2) XVII, p. 17; 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 277; 1897, Proc. Zool. Soc. London, p. 800. Sjöstedt, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 9. Boulenger, 1898, Ann. Mag. Nat. Hist., (7) II, p. 130; 1898, Ann. Mus. Stor. Nat. Genova, (2) XVIII, p. 716; 1900, Proc. Zool. Soc. London, p. 448. Tornier, 1900, Zool. Jahrb. (Syst.), XIII, p. 586; 1901, Arch. Naturg., LXVII, p. 69. Mocquard, 1902, Bull. Mus. Hist. Nat. Paris, p. 405. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 581. Werner, 1902, Verh. Zool.-Bot. Ges. Wien., LII, p. 342. Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 198; 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 110. Johnston, 1906, Liberia, II, p. 833. Boulenger, 1907, Proc. Zool. Soc. London, p. 483. Roux, 1907, Zool. Jahrb. (Syst.), XXV, p. 405. Boulenger, 1909, Ann. Mus. Stor. Nat. Genova, (3) IV, p. 310; 1910, Ann. S. African Mus., V, p. 458. Meek, 1910, Publ. Field Mus. Zool., VII, p. 406. Nieden, 1910, Arch. Naturg., LXXVI, p. 235. Hewitt, 1911, Ann. Transvaal Mus., III, p. 46. Lönnberg, 1911, Svenska Vetensk. Akad. Handl., XLVII, No. 6, p. 10. Sternfeld, 1911, Mitt. Zool. Mus. Berlin, V,

p. 415; 1911, Sitzber. Ges. Naturf. Freunde Berlin, p. 245; 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 203. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 65.

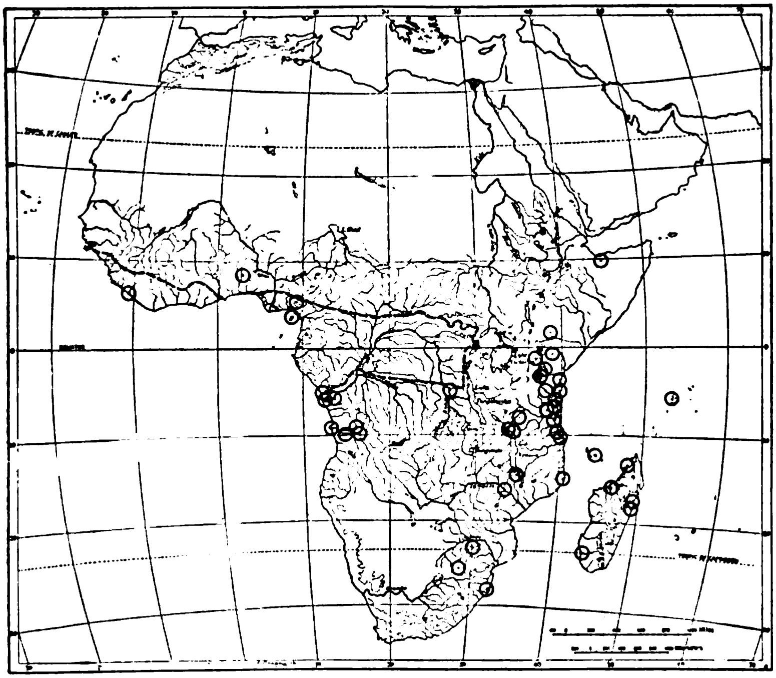
Hemidactylus mercatorius Gray, 1831, Zool. Misc., p. 58; 1845, Cat. Lizards, p. 155. Boettger, 1877, Abh. Senck. Ges. XI, p. 23, Pl. I (VI), fig. 4.

Hemidactylus platycephalus Peters, 1854, Monatsber. Akad. Wiss. Berlin, p. 615. Bocage, 1873, Jorn. Sci. Lisboa, IV, p. 209. Günther, 1879, Ann. Mag. Nat. Hist., (5) III, p. 217.

Hemidactylus frenatus Boettger, 1878, Abh. Senck. Ges., XI, p. 275, Pl. I, fig. 1.

There are seventy-five specimens of *Hemidactylus mabouia* in the collection, all from the Lower Congo: A. M. N. H. No. 10176 (August 1915) is from Banana; 10103 (January 1915), Boma; 10177 (September 1915), St. Paul de Loanda; 10110–10175 (June–July 1915), Zambi.

The distribution of this cosmopolitan species in Africa is suggestive of colonization. Both East and West African records are usually confined to the coast, though it extends to the interior in British Central Africa and even to the Lualaba (Nyangwe, Boulenger, 1897, p. 277). In South Africa,



Map 5. Distribution of *Hemidactylus mabouia* in Africa. A house gecko, probably imported into Africa from the Western Hemisphere.

where it appears to be confined to Portuguese East Africa and the Transvaal, it is the only species of the genus which reaches its greatest diversification in North East Africa, with not fewer than fifteen species in the Somali region.

The series is very uniform in all essential characters. The dorsal tubercles are in 14–18 irregular rows and no variation in their abundance, such as that described in Madagascan specimens by Boettger (1879, p. 478), is observable. These tubercles are about one-half to one-third the diameter of the interspaces dorsally, somewhat more closely set on the sides. They may be rounded, conical, (often striate) or weakly keeled, with considerable variation in the same individual. The tubercles on the sacral region, on the whole, appear to be most frequently and most distinctly keeled. The subdigital lamellæ are constant in number within the limits given by Boulenger (1885, p. 122). The tail of the younger individuals appears to be somewhat shorter than in the adult, the head slightly longer. In no specimen do the postmentals fail to meet. In their usual disposition the first pair form a broad suture, while the second pair are rather widely separated; in eight specimens one of the anterior pair is in contact with both postmentals on the opposite side, and in three the second pair meet symmetrically behind the first.

The coloration is constant and characteristic, although the dorsal crossbars may be entirely faded in some specimens, which are then uniform light gray with a white venter and dark digital lamellæ. Most specimens show about five dark cross-bars on the back and ten on the tail, the latter often more distinct than the dorsal. The venter is immaculate white in all save one specimen, which has the belly scales punctate with brown dots. Sjöstedt (1897, p. 9) has described a similar but more pronounced coloration in three specimens from Kamerun.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	11	109–145	120.2 mm.
	♀	11	91–128	112.7 mm.
Body	♂	25	42–64	55.0 mm.
	♀	27	38–64	51.8 mm.
Tail	♂	11	60–79	67.4 mm.
	♀	11	51–70	62.4 mm.
Tail/Length	♂	11	.54–.60	.56
	♀	11	.53–.60	.55

		Sex	No. of Specimens	Extremes	Average
	Axilla to Groin	♂	25	23–36	30.2 mm.
		♀	27	22–36	29.0 mm.
	Arm	♂	25	14–23	18.8 mm.
		♀	27	14–21	17.4 mm.
	Leg	♂	25	18–31	24.8 mm.
		♀	27	18–28	23.0 mm.
	Length Head	♂	25	12.2–18.0	15.6 mm.
		♀	27	11.8–17.5	14.6 mm.
	Ventrals, Transversely	♂	24	36–42	38.8
		♀	27	37–47	40.2
Subdigital Lamellæ	1st Finger	♂	25	5–6	5.5
		♀	27	5–6	5.4
	3rd Finger	♂	25	7–8	7.6
		♀	27	7–9	7.7
	1st Toe	♂	25	5–6	5.5
		♀	27	5–6	5.5
	3rd Toe	♂	25	8–9	8.2
		♀	27	7–9	8.2
	Femoral Pores	♂	25	12–18	15.5

"These geckos resemble *H. brookii* although the tubercles on the back as well as those of the cross-rows on the slender tail are considerably smaller. On dark wood they appear dusky, and on whitewashed walls pale white, the dark cross-bands and mottlings discernible in the extremes of both phases. In the field they hide in any dark, dry, convenient place on the ground, as well as in the hollows of trees and beneath loose pieces of bark.

"Nearly all of the sixty-five specimens from Zambi were collected in a small wooden latrine where hundreds of flies swarmed. Here, in relative darkness, they fed at all hours of the day, but in other buildings remained in hiding until nightfall. Probably the hours of their activity are dependent on the facility with which they can procure prey. After we had taken the first specimen, a thorough search resulted in the gathering of seven others, and within a fortnight more than thirty were taken from the same shed. At the sound of footsteps they ran as fast as lizards to their habitual retreat, a dark space between boards above the door, from which most of the others had been removed, passing by equally dark cracks closer to the food supply, which ordinarily consists chiefly of spiders" [H. L.].

Hemidactylus muriceus Peters

Hemidactylus muriceus PETERS, 1870, Monatsber. Akad. Wiss. Berlin, p. 641; 1881, Sitzber. Ges. Naturf. Freunde Berlin, p. 147. BOULENGER, 1885, Cat. Lizards, I, p. 123. BOCAGE, 1895, Herpétol. Angola, p. 13. TORNIER, 1901, Beiheft, Arch. Naturg., LXVII, p. 70; 1902, Zool. Jahrb. (Syst.), XV, p. 666, Pl. xxxv, fig. 1. MÜLLER, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 554.
Hemidactylus intestinalis WERNER, 1897, Zool. Anz., XX, p. 263.

Two specimens are referable to this species, which has been redescribed and figured by Tornier (1902, p. 666, Pl. xxxv): A. M. N. H. No. 10178 (September 1913) is from Avakubi; 10179 (June 1914), Medje.

Further records of this rare species will be of exceptional interest. The distribution, as at present known, is anomalous in including the open country north of the forest (Togo), the Rain Forest (Kamerun, Ituri) and the open country south of the forest (Kwango). The logical inference would be that it is a forest species spreading beyond the limits of the Rain Forest on either side, probably in the isolated patches of forest along the streams (there are no recorded notes on the habitat of the species), but its apparent absence from the relatively well known Gaboon country is unexplained.

The strikingly slender body and elongate legs appear to be characteristic, as are the small but long and pointed tubercles. The colors in life are rather dark brown above; the venter yellowish brown, dotted with dark spots. The coloration in alcohol of one specimen is best described as grayish brown, washed with darker, while the second has a nuchal and seven indistinct dorsal cross-bands, of which the two posterior are distinct and the two anterior are visible only as pairs of black marks, one on each side.

Measurements and Scale Characters

	No. 10178, ♂	No. 10179, ♂
Preanal Pores	10	8
Length	[84] [1]	112 mm.
Body	51	54 mm.
Tail	[33] [1]	58 mm.
Tail/Length		.51
Axilla to Groin	29	31 mm.
Snout to Arm	22	21 mm.
Arm	20	18.5 mm.
Leg	24	25 mm.
Head Length	14.3	15 mm.
Head Breadth	9.7	11 mm.
Snout	7	7 mm.
Ventrals, Transversely	35	38
Rows of Tubercles	10–12	12
Labials	$\frac{10-10}{9-9}$	$\frac{9-10}{8-8}$
Digital Lamellæ	$\frac{6-8}{6-9}$	$\frac{7-9}{7-9}$

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[1] In this and similar tables, the measurements of length and tail are put in square brackets if the tail has been reproduced.

Hemidactylus longicephalus Bocage[1]

Map 6

Hemidactylus longicephalus Bocage, 1873, Jorn. Sci. Lisboa, IV, p. 210.
Hemidactylus longicephalus (*longiceps*) O'Shaughnessy, 1875, Zool. Rec., X, p. 89.
Hemidactylus bocagii Boulenger, 1885, Cat. Lizards, I, p. 125. Strauch, 1887, Mém. Acad. Sci. St. Pétersbourg, (7) XXXV, p. 31. Bocage, 1895, Herpétol. Angola, p. 11. Boulenger, 1900, Proc. Zool. Soc. London, p. 448. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exped., IV, p. 203.
Hemidactylus hecqui Boulenger, 1901, Ann. Mus. Congo, (2) II, fasc. 1, p. 7, Pl. III, fig. 1.

Five specimens from the Lower Congo region have been referred, with some doubt, to this species. In the absence of material for comparison, the writer has been guided by geographical probability in identifying the specimens as *longicephalus* rather than *hecqui*, as will be discussed below. A. M. N. H. No. 10180 (June 1909) is from Thysville; 10181–83 (June 1915), 10184 (July 1915), Zambi.

The geographic improbability of the occurrence of forms as closely related as *longicephalus* and *hecqui* in the same region, together with the fact that the present specimens are in some characters intermediate between the two, seems to make the reference of the single specimen of *hecqui* from Lake Tanganyika to *longicephalus* plausible at least, for the present specimens could certainly be identified from the figure of *hecqui* with that species. The majority of the records for *longicephalus* being from Angola, the fact that it was not taken in the Ituri region, together with the analogous distribution of some Sudanese species, lead the writer to the hypothesis that it is an open country species, reaching Lake Tanganyika via the forest border, and possibly invading the forest region along the sea coast, where the clearings for the plantations have modified the habitat.

These five specimens agree in a similar habitus and general appearance, in having small subcaudal scales, in the number of subdigital lamellæ, and in the possession of small, more or less keeled, tubercles in 14–16 rows. Two specimens have the first labials broadly entering the nostrils; one has them narrowly entering; and in the two juvenile specimens the first labial enters the nostril on one side, but is excluded on the other. The relations with *hecqui* are made still closer by the fact that one specimen has rather large ventral scales, 29 in a transverse series; a second has 31; the other three, 35–45. The male presents a very strong tubercle on each side of the base of the tail, as described for *longicephalus*, but not evident in the figure of *hecqui*. Finally, the dorsal coloration in one specimen is almost exactly that of the figure of *hecqui*, with a fairly distinct dorsolateral light line on each side. The remaining four specimens are more obscurely colored, the venter in each case a dirty gray. The specimen from Thysville was found hiding beneath some old banana leaves lying upon a mushroom-shaped termite nest.

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[1] O'Shaughnessy's emendation to *longiceps*, synonym *longiceps* Cope, cannot be accepted.

Measurements and Scale Characters

	No. 10181, ♂	No. 10180, ♀	No. 10184, ♀	No. 10182, Juv.	No. 10183, Juv.
Preanal Pores	8				
Length	[68]		90	40	46 mm.
Body	41	43	47	20	23 mm.
Tail	[27]		43	20	23 mm.
Tail/Length			.47	.50	.50
Axilla to Groin	22	23	27 mm.		
Snout to Arm	16.5	17	17 mm.		
Arm	14.5	15	15 mm.		
Leg	17	20	19 mm.		
Head Length	11.7	12	13 mm.		
Head Breadth	8	8.7	9 mm.		
Snout	5.5	5.5	6.5 mm.		
Ventrals, Transversely	41	27	35	31	36
Labials	$\frac{9-9}{9-9}$	$\frac{11-9}{9-7}$	$\frac{11-11}{9-9}$		
Subdigital Lamellæ	$\frac{6-7}{5-8}$	$\frac{6-7}{6-8}$	$\frac{6-7}{5-8}$		

Hemidactylus brookii Gray

Plate XIV, Figure 1; Map 6

Hemidactylus brookii Gray, 1844, Zool. Erebus and Terror, Pl. xv, fig. 2; 1845, Cat. Lizards, p. 153. Boulenger, 1885, Cat. Lizards, I, p. 128. Strauch, 1887, Mém. Acad. Sci. St. Pétersbourg, XXXV, p. 32. Günther, 1888, Proc. Zool. Soc. London, p. 50; 1894, p. 85. Boulenger, 1895, Proc. Zool. Soc. London, p. 532; 1896, Ann. Mus. Stor. Nat. Genova, (2) XVII, p. 6. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 12. Boulenger, 1898, Ann. Mus. Stor. Nat. Genova, (2) XVIII, p. 716. Flower, 1900, Proc. Zool. Soc. London, p. 967. Tornier, 1900, Zool. Jahrb. (Syst.), XIII, p. 586; 1901, Beiheft, Arch. Naturg., LXVII, p. 70; 1902, Zool. Jahrb. (Syst.), XV, p. 669. Peracca, 1904, Boll. Mus. Torino, XIX, No. 467, p. 2. Tornier, 1905, Zool. Jahrb. (Syst.), XXII, p. 368. Boulenger, 1906, Ann. Mus. Stor. Nat. Genova, (3) II, p. 199. Werner, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI, part 1, p. 1831. Boulenger, 1908, Ann. Mus. Stor. Nat. Genova, (3) IV, p. 5. Pellegrin, 1909, Bull. Mus. Hist. Nat. Paris, XV, p. 413. Meek, 1910, Publ. Field Mus. Zool., VII, p. 406. Lönnberg, 1911, Svenska Vetensk. Akad. Handl., XLVII, No. 6, p. 10. Boulenger, 1911, Ann. Mus. Stor. Nat. Genova, (3) V, p. 162. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 204. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 66. Klaptocz, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 280.

Hemidactylus brookii togoensis Werner, 1897, Verh. Zool.-Bot. Ges. Wien, XLVII, p. 396; 1902, LII, p. 336.

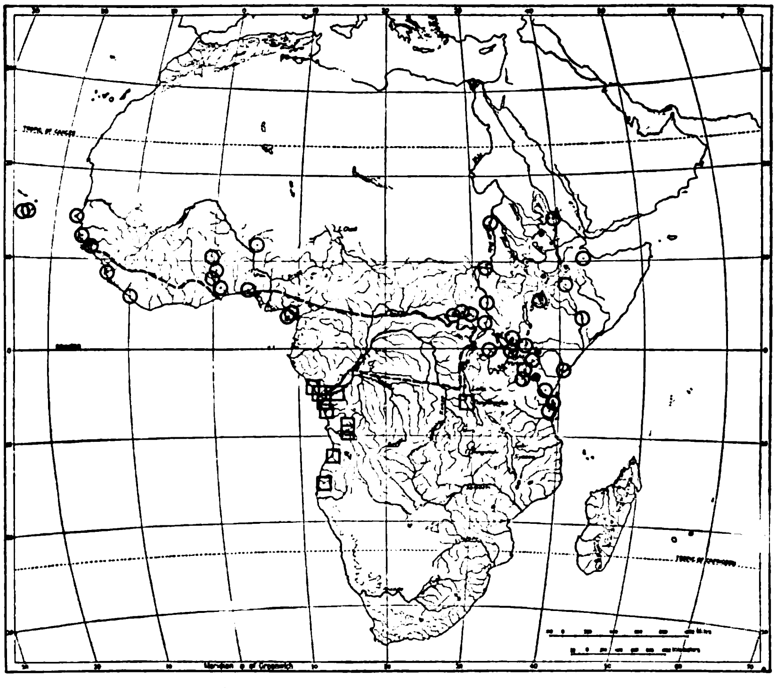
Hemidactylus verruculatus (part) Gray, 1845, Cat. Lizards, p. 154.

Hemidactylus angulatus [1] Hallowell, 1852, Proc. Acad. Nat. Sci. Philadelphia, p. 63, fig.

Hemidactylus cyanodactylus (*non* Rafinesque) Girard, 1858, U. S. Explor. Exp., p. 254, Pl. xxv, figs. 17–24.

Hemidactylus guineensis Peters, 1866, Monatsber. Akad. Wiss. Berlin, p. 640. Bocage, 1873, Jorn. Sci. Lisboa, IV, p. 209.

Hemidactylus affinis Steindachner, 1870, Sitzber. Akad. Wiss. Wien (math.-natur.), LXII, part 1, p. 328. Boettger, 1881, Abh. Senck. Ges., XII, p. 406.



Map 6. Distribution of *Hemidactylus*.

□ *Hemidactylus longicephalus*. An Angolan species ranging to Lake Tanganyika, south of the forest.

○ *Hemidactylus brookii*. A Sudanese species extending into Northeast and East Africa and, as a house gecko, invading the forest.

Hemidactylus gleadowii Murray, with its synonymy, has been referred to *Hemidactylus brookii* by Werner (1907, p. 1831).

Seventy-nine specimens of this species were collected as follows: A. M. N. H. Nos. 10245–48 (February 1911), 10249–57 (September 1912), 10258–

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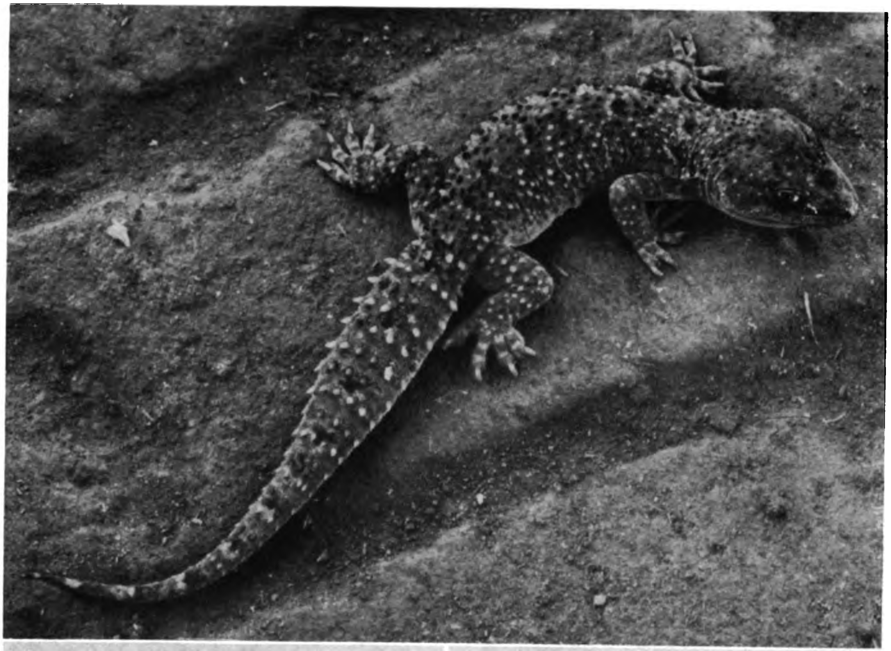
[1] Type examined.

PLATE XIV

Figure 1. *Hemidactylus brookii* Gray. A. M. N. H. No. 10254; ♀; length 122 mm.

Figure 2. *Lygodactylus picturatus gutturalis* Bocage. Dorsal view. A. M. N. H. No. 10325; ♂; length 78 mm.

Figure 3. *Lygodactylus picturatus gutturalis* Bocage. A. M. N. H. No. 10325. Ventral view with characteristic throat marking.



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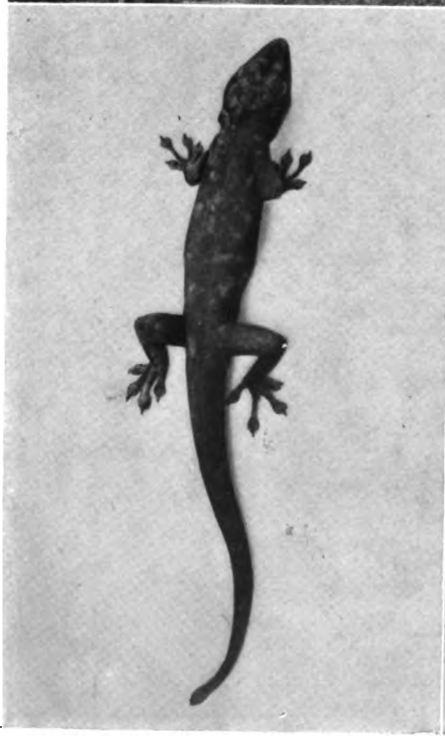

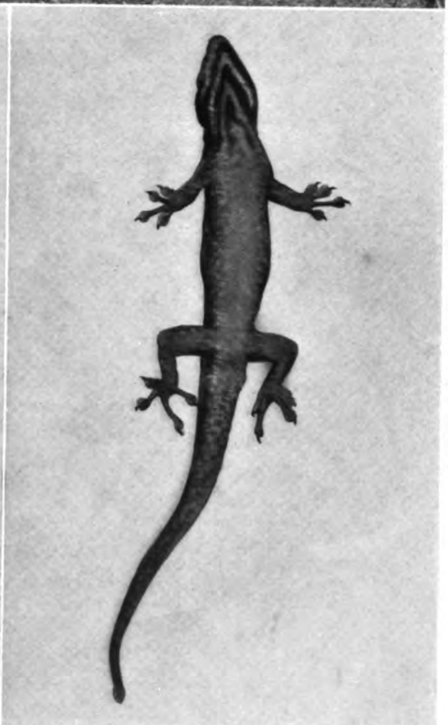

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60 (October 1912), 10261 (November 1912), 10262–63 (January 1913) are from Faradje; 10234–43 (May 1912), 10244 (June 1912), Garamba; 10185–10229 (November 1910), Niangara; 10230–33 (November 1911), Yakuluku.

Hemidactylus brookii is a virile Sudanese species which has spread from Cape Verde, and the Cape Verde Islands, to Somaliland, invading the forest area in Sierra Leone and Liberia, and again in Kamerun, and extending well south through Uganda into the open country of German East Africa (see Map 6). If the identification of the East Indian *H. gleadowii* Murray with this species (Werner, 1907, p. 1831) is justified, its range is comparable in extent with that of *Hemidactylus mabouia.*

The measurements in the series are fairly constant. The tail length varies from .49 to .55 of the total. The maximum length, 138 mm., considerably exceeds the measurements of Boulenger (1885, I, p. 128) and Werner (1907, p. 1834), 118 and 117 mm. respectively. The head is very slightly more than a fourth of the body length. There is no appearance of incipient imbrication of the dorsal granules (Tornier, 1897, p. 12) except as the strongly imbricate ventrals are approached. The granular body scales are close-set and often keeled. The tubercles are large, larger than the interspaces, which consist usually of two, sometimes three, rows of granular scales. The mid-dorsal line is free from tubercles, with four to six rows of granular scales between the first rows of tubercles on each side. The imbricate ventrals vary from 36 to 48 in a transverse series. The subdigital lamellæ are 4–6 on the first digits, 6–9 (9 rare) on the median, a slightly wider range than given by Boulenger (1885, I, p. 128).

Werner, (1907, p. 1833), in his last mention of this species, has not referred to his subspecies *togoensis* (Werner, 1897, p. 397) characterized by large tubercles, exceeding the interspaces, and by tails *broader in the females than in the males.* This relation is the inverse of that in the eastern Sudan specimens. Tornier (1901, p. 70) has not strengthened the position of *togoensis* and it appears that the individuals from Lagos are aberrant for the species.

The first pair of postmentals are narrowly separated in twelve of the seventy-nine specimens.

The coloration has been described by Werner (1907, p. 1834) and little is to be added. The juvenile pattern may persist in the adult, and the longitudinal rows of spots appear to be derivable from the breaking up of the cross-bands.

Hallowell's *Hemidactylus angulatus* (1852, p. 63), based on a single specimen originally said to be from Liberia but in 1857 (p. 48) included with five additional specimens stated to be from Gaboon, is without doubt referable to this species. The type (Phila. Acad., No. 7431) is a shrunken and worn specimen, the shrinking having produced the apparently diagonal rows of tubercles described by Hallowell. The number and relative size of the tubercles, the disposition of the femoral pores, and the digital lamellæ, $\frac{6\text{–}8}{6\text{–}8}$, are exactly as in *brookii*, but the fact that the tubercles are worn almost flat makes identification, at first glance, difficult. The five specimens added in 1857 are obviously *brookii*, much better preserved.

The six specimens agree in having the first postmentals well separated by the mental, with one to three small scales between, and in having somewhat longer limbs in proportion to body length than the *H. brookii* of the eastern Sudan. There is a possibility, therefore, that in Liberia there may exist a race of *brookii* for which the subspecific designation *angulatus* Hallowell will have to be retained. *H. brookii* has not been recorded in more recent collections from Gaboon, and Hallowell's specimens are almost certainly from Liberia.

Each of the four specimens taken at Niangara, November 1910, contained two eggs ranging from 5 × 4 mm. to 7.6 × 6.2 mm.

Of eight stomachs examined, seven contained parasitic worms; one, a large lycosid spider; five, cockroaches; and two, termites.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	17	102–138	117.7 mm.
	♀	14	87–124	108.6 mm.
Body	♂	40	42–67	57.3 mm.
	♀	30	41–61	53.8 mm.
Tail	♂	17	54–76	62.4 mm.
	♀	18	46–67	57.0 mm.
Tail/Length	♂	17	.49–.55	.521
	♀	18	.50–.55	.525
Axilla to Groin	♂	40	27–39	31.9 mm.
	♀	30	12–35	30.7 mm.
Arm	♂	40	14–21	17.9 mm.
	♀	30	13–19	17.1 mm.
Leg	♂	40	19–27	23.2 mm.
	♀	30	18–27	22.3 mm.
Head	♂	40	12–18	15.2 mm.
	♀	30	11–16	14.1 mm.

		Sex	No. of Specimens	Extremes	Average
Ventrals, Transversely		♂	41	36–48	39.6
		♀	35	34–46	40.4
Subdigital Lamellæ	1st Finger	♂	39	4–6	4.6
		♀	37	4–5	4.3
	3rd Finger	♂	39	6–7	6.2
		♀	37	5–7	6.3
	1st Toe	♂	39	4–6	4.9
		♀	37	4–6	4.8
	3rd Toe	♂	39	6–9	7.0
		♀	37	6–8	7.0
	Femoral Pores	♂	41	9–16	12.2

"The commonest geckos in the northeastern Uele belong to a widely distributed species, *H. brookii*, greatly attracted by human settlements and seldom attaining more than five and a half inches (134 mm.) in length. From other forms in the same region they are easily distinguished by the three-cornered, horny, ridged scutes dotting back and hindlimbs, and the cross-rows of pointed tubercles on the anteriorly thickened tail (Plate XIV, Fig. 1), the tip of which is covered with fine scales similar to those on regenerated tails. Their dull waxy appearance and the dusky brown, light reddish brown, or even pale gray upper side with more or less conspicuous crossbars and mottlings in the various color phases match the environment fairly well and help conceal them. Most of their life is spent hiding in darkness, sometimes as many as half a dozen together. They are generally considered nocturnal, although in the dim light of the Mangbetu huts they were active during the day. In the field they are found beneath heaps of dead and dry vegetation, pieces of wood, stones and clods, and in native huts or houses the cracks in walls or the thatch are the favorite retreats, although any dark place, an empty pot, an overturned wooden dish or a rolled up mat, is satisfactory. Perhaps their wide distribution has been helped by incidental voyages in bundles and porters' loads, into which they often creep during the night.

"In our house at Faradje we saw a few running along the ridge pole. From faint noises made, falling dust, and the frequency with which some gecko lost its foothold we concluded that these sluggards often engaged in civil strife. Many tumbled thirty feet to the brick floor, landed on their feet every time, and, after looking around for a second or two, ran off unhurt; even the fragile tail had not suffered. One still had a small white moth in its mouth, evidently the cause of the downfall (and in the cyanide jar disgorged a pellet, 15 mm. by 4 mm., of moth wings and legs). Roaches, crickets, spiders, and termites have been found in the stomach contents; with the latter, granules of quartz from the soil had apparently been swallowed. When climbing walls and walking on the ceiling, or when close to insects, they move with unexpected rapidity. They have no means of defense, and when held, they squirm, attempt to bite, faintly squeak, and often escape by leaving either tail or part of the easily torn skin in the captor's hand" [H. L.].

Hemidactylus fasciatus Gray

Plate XV, Figure 1; Map 7

Hemidactylus fasciatus Gray, 1831, Zool. Misc., p. 58; 1845, Cat. Lizards, p. 154. Peters, 1875, Monatsber. Akad. Wiss. Berlin, p. 197. Boulenger, 1885, Cat. Lizards, I, p. 124, Pl. xi, fig. 4. Sjöstedt, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 13. Mocquard, 1897, Bull. Soc. Philom. Paris, (8) IX, p. 6. Werner, 1899, Verh. Zool.-Bot. Ges. Wien, XLIX, p. 133. Boulenger, 1900, Proc. Zool. Soc. London, p. 448. Tornier, 1901, Zool. Anz., XXIV, p. 61; 1901, Beiheft, Arch. Naturg., LXVII, p. 69. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 661. Werner, 1902, Verh. Zool.-Bot. Ges. Wien, LII, p. 342. Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 198. Johnston, 1906, Liberia, II, p. 833. Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 555; 1913, Zool. Anz., XLI, p. 234.

Leiurus ornatus Gray, 1845, Cat. Lizards, p. 157.

Hemidactylus formosus Hallowell, 1856, Proc. Acad. Nat. Sci. Philadelphia, XXIV, p. 148.

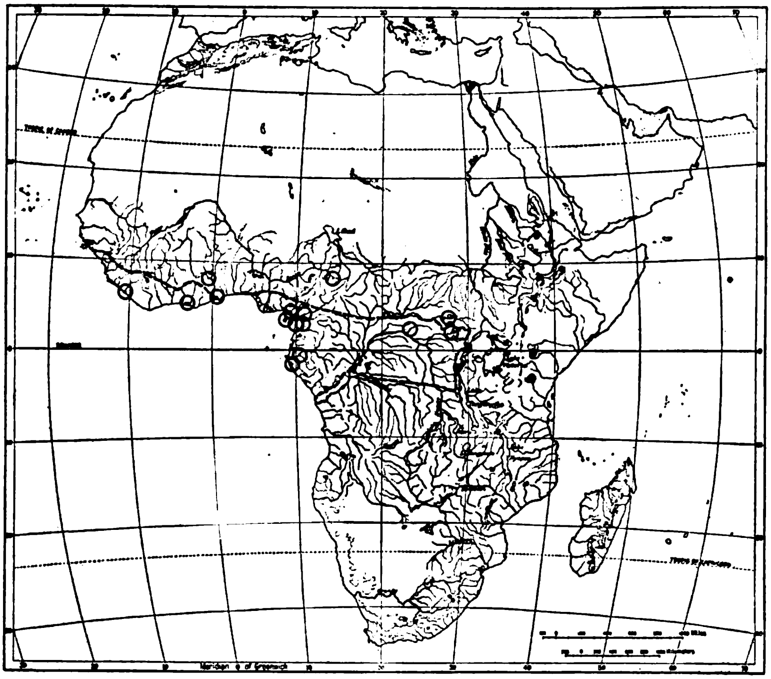
There are six specimens in the present collection: A. M. N. H. Nos. 10265–69 (May–June 1914) are from Medje; 10264 (June 1913), Niangara.

H. fasciatus has been recorded chiefly from the West African region, from Liberia to the Congo. Müller (1913, p. 234) has extended its range to the eastern portion of the Rain Forest. The known distribution is shown in Map 7. While probably essentially a forest form, the Togo and Kamerun "Hinterland" records show that, like *muriceus*, it is by no means confined to the Rain Forest proper.

The only differences to be noted between the Ituri series and Boulenger's excellent description (1885, I, p. 124, Pl. xi, fig. 4) are smaller size, slightly fewer digital lamellæ, and a difference in color pattern. The average body length in the six specimens is 71 mm., as compared with 80 mm. given by Boulenger (*loc. cit.*) and 95 mm. in a specimen from Liberia (type of *H.*

formosus Hallowell). The maximum count of lamellæ is $\frac{7-8}{8-9}$; Boulenger's maximum is $\frac{8-10}{8-10}$; Hallowell's specimen has $\frac{6-10}{8-11}$.

General color light gray; tubercles lighter. There is a dead black band on the nape, anteriorly prolonged to the eyes, posteriorly notched. Three black bands on the back followed by six or seven on the tail, those behind the first two forming rings about the tail; the last ring of black may have a white spot beneath. The bands on both body and tail are outlined with white. These bands are distinctly bilobate, especially the first behind the nape, which is only one-third to one-half as wide on the mid-dorsal line as laterally. At their widest point the bands are slightly or considerably narrower than the interspace. The tail bands are subequal to the interspaces anteriorly, much longer behind; the tip either light or dark.



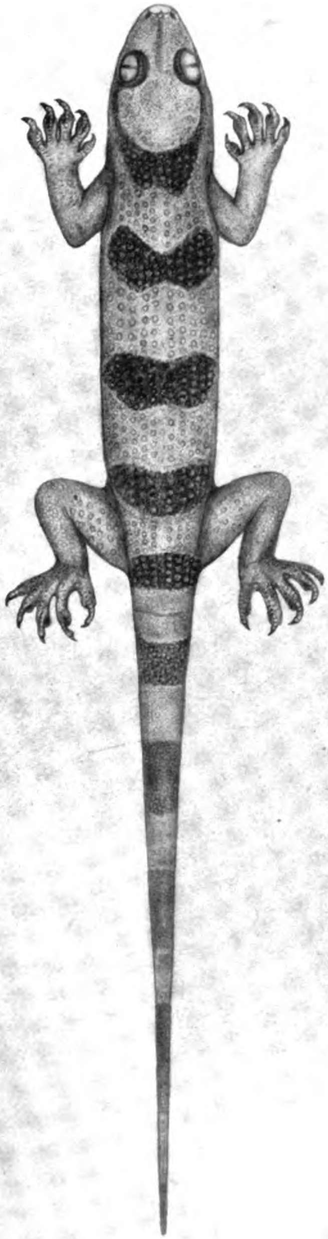
Map 7. Distribution of *Hemidactylus fasciatus*. Characteristic of the entire Western Forest Province; occurring outside the Rain Forest in forest "islands" along streams.

The bands of the specimen figured by Boulenger (*loc. cit.*) are subequal to the interspaces and only very slightly emarginate, in which respects Hallowell's two Liberian specimens agree exactly. More or less variation in these details is observed in specimens from Kamerun in the Museum of Zoology, University of Michigan.

PLATE XV

Figure 1. *Hemidactylus fasciatus* Gray. A. M. N. H. No. 10265; ♀; length 168 mm.

Figure 2. *Hemidactylus ituriensis*, new species. A. M. N. H. No. 10270; ♀; length 162 mm.



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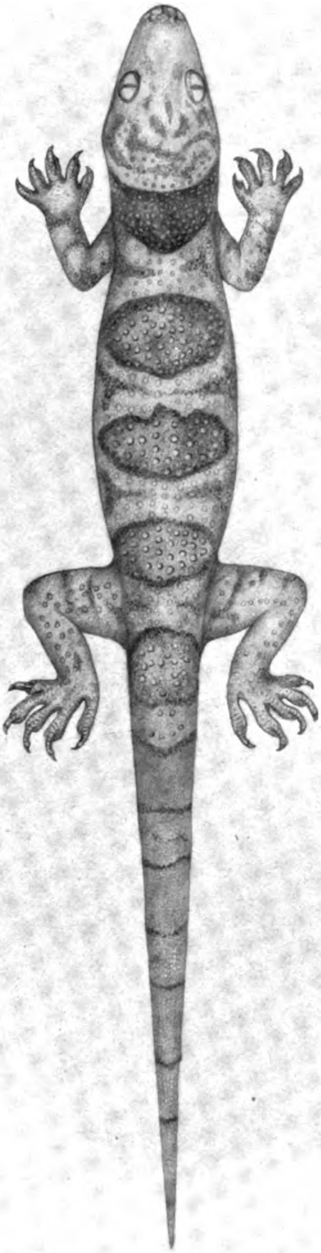

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In the absence of field notes on the color, Tornier (1901, p. 70) may be quoted (translation) as follows: The animal is a beautiful purplish brown in the dark; the bands brownish black, the borders of these bands and interspersed smaller scales are bright golden yellow. On being brought into the light the animal soon takes on the coloration of alcoholic specimens.

Measurements and Scale Characters

	A. M. N. H.						A. N. S. P.	
	No. 10264	10265	10266	10267	10268	10269	7451[1]	7452[1]
Sex	♀	♀	♂	♀	♀	♂	♂	♀
Femoral Pores			16–16			17–17	17–19	
Length	[138]	168	147	[112]	126	[133]		148 mm.
Body	77	77	66	74	57	76	95	70 mm.
Tail	[61]	91	81	[38]	69	[57]		78 mm.
Tail / Length		.54	.55		.55			.53
Axilla to Groin	44	47	36	43	32	44		
Snout to Arm	31	28	25	28	23	29		
Arm	26	23	22	26	19	26	32	24 mm.
Leg	32	32	29	33	24	33	37	31 mm.
Head Length	20	19	17.5	18	15	19.5	24.2	19 mm.
Head Breadth	14	14	12	14	11	14	18	14.2 mm.
Snout	8.5	8.	7.5	8.	6.8	8.	10	8 mm.
Ventrals, Transversely	42	42	38	42	42	38	38	38
Labials	$\frac{10-10}{9-10}$	$\frac{11-11}{10-9}$	$\frac{10-12}{10-10}$	$\frac{10-9}{9-9}$	$\frac{9-9}{10-9}$	$\frac{10-10}{9-9}$		
Subdigital Lamellæ	$\frac{7-7}{8-9}$	$\frac{7-8}{7-9}$	$\frac{6-8}{7-8}$	$\frac{7-8}{6-8}$	$\frac{6-8}{6-9}$	$\frac{7-8}{7-9}$	$\frac{7-8}{7-10}$	$\frac{6-10}{8-11}$

Hemidactylus ituriensis, new species

Plate XV, Figure 2; Plate XVI; Text Figure 7

Six specimens, from the forests of the northeastern affluents of the Congo (Ituri-Aruwimi, Poko-Uele, and Tshopo), have been separated from the preceding species as representing an undescribed, though closely related, form. A. M. N. H. No. 10273 (September 1913) is from Akenge; 10271 (October 1909) and 10272 (August 1914) from Avakubi; 10270 (September 1909), Batama; 10274 (July 1914), Medje; 10275 (September 1914), Panga.

Apparently this species is indigenous to the eastern part of the Rain Forest.

Diagnostic characters

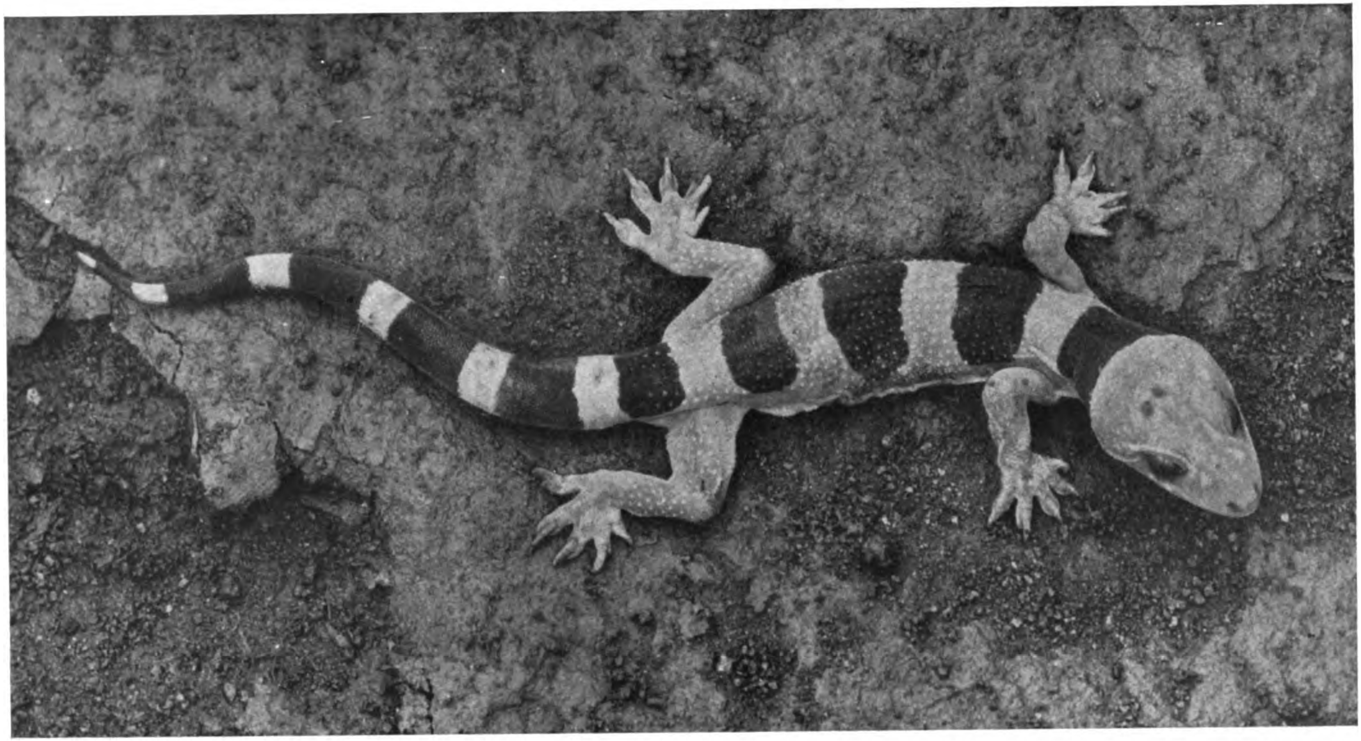
Closely related to *H. fasciatus* Gray, somewhat stouter, with a wider and larger head, and a shorter tail. The following characters may be enumerated: (1) higher

---

[1] Types of *H. formosus* Hallowell.

PLATE XVI

Hemidactylus ituriensis, new species, showing a variant coloration. A. M. N. H. No. 10273; ♀; length 137 mm.



number of subdigital lamellæ, from $\frac{10\text{-}10}{9\text{-}11}$ to $\frac{12\text{-}12}{11\text{-}13}$; (2) enlarged subcaudals about one-third the width of the tail, more than half the width in *fasciatus;* (3) femoral pores in the male 8–8, compared with 16–20 on each side in *fasciatus;* the very distinct coloration and head form described below may be subject to more or less variation.

Detailed Description

Type: A. M. N. H., No. 10272.

Rather stout, with strong legs, the tail shorter than the body (.48 of the length in the two specimens with entire tail). The head large, broad, and angular in outline, the breadth averaging .78 of the length. Snout longer than the distance between the eye and ear opening, twice or nearly twice the diameter of the eye, medianly grooved above, with a rounded canthus. Eye large, with vertical pupil; ear opening small, narrow, nearly horizontal in type, round or horizontally oval in the paratypes. The digits distinctly webbed at their base. A faint or fairly well developed lateral fold, without tubercles.

Snout covered with small convex granules, subequal anterior to the orbits, much smaller on the back of the head, with a few small tubercles intermixed just in front of the black band of the nape. Rostral four-sided, three-fourths as high as wide, with median cleft above. Nostril between rostral, first labial, and four or five small nasals. Labials 10–11 above, 8–9 below in the type; the extremes of the series, $\frac{9\text{-}12}{8\text{-}10}$. Mental large triangular, broader in proportion to its length than in *fasciatus;* a pair of postmentals meeting behind its point, and a series of small sublabials below the anterior lower labials.

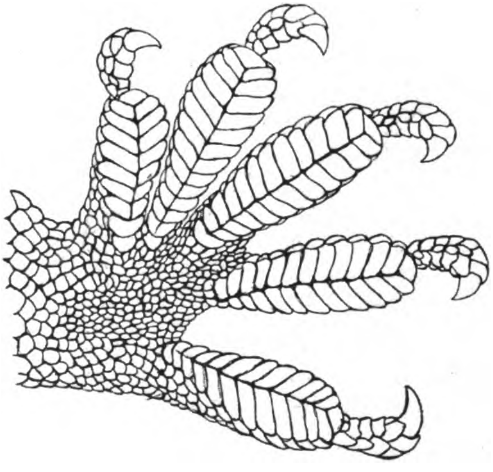


Fig. 7. Plantar view of the foot of *Hemidactylus ituriensis* (type; 10272, × 4).

Dorsal scales granular with rounded tubercles in sixteen to eighteen more or less regular rows. Ventral scales imbricate, in forty-two to forty-eight transverse series. The tail without tubercles, covered above with small imbricate scales; a series of transversely enlarged scales covering the middle third below. The subdigital lamellæ, $\frac{11-11}{10-13}$ in the type, varying in the series from $\frac{10-12}{9-11}$ to $\frac{12-12}{11-13}$. There are eight femoral pores on each side in the single male specimen.

The color pattern in general is closely similar to that of *fasciatus*, while the differences in detail are considerable. The head and light interspaces instead of being uniform are strongly mottled with dark color. The sharply defined band from eye to nape-mark in *fasciatus* is very faint or absent. The bands show no median notching (as frequent in *fasciatus*) and are wider than the interspaces, usually twice as wide. The dark bands instead of being uniform black are brownish, much lighter at the center, dark only on the border; most of the tubercles light. The legs are of the ground color of the body, similarly mottled. Venter immaculate, gray. A single specimen, No. 10273, presents the dead black bands and immaculate interspaces of *fasciatus*, but agrees in all scale characters and in the absence of the ocular band with the other five of the series (Pl. XVI).

The coloration in life, from the field notes, is

yellowish white above (tinged with greenish in one specimen) with faint dark irregular markings. Large dark brown velvety cross-bars, darker on their edges, dark brown rings over tail, lighter beneath. Venter whitish yellow, or greenish, with yellowish throat.

Measurements and Scale Characters

A. M. N. H. No.	10272	10274	10271	10273	10275	10270
Sex	♂	♀	♀	♀	♀	♀
Femoral Pores	8–8					
Length	[134]	[154]	[133]	137	[152]	162 mm.
Body	79	88	83	71	86	89 mm.
Tail	[55]	[66]	[50]	66	[66]	78 mm.
Tail /Length				.48		.48
Axilla to Groin	42	47	46	41	50	47 mm.
Snout to Arm	33	34	32	28	35	35 mm.
Arm	27	27	30	26	27	28 mm.
Leg	36	35	35	30	35	35 mm.
Head Length	20.5	23	22	18	22	22 mm.
Head Breadth	11.5	18	16.5	14	18	16.5 mm.
Snout	9	10	9	8	9.2	9.5 mm.
Ventrals, Transversely	44	42	48	42	44	42
Labials	$\frac{10-11}{8-9}$	$\frac{11-11}{9-9}$	$\frac{10-10}{9-10}$	$\frac{11-9}{9-9}$	$\frac{11-11}{9-9}$	$\frac{11-11}{9-9}$
Subdigital Lamellæ	$\frac{11-11}{10-13}$	$\frac{11-10}{11-12}$	$\frac{12-12}{11-13}$	$\frac{10-11}{10-11}$	$\frac{11-11}{9-11}$	$\frac{11-12}{10-13}$

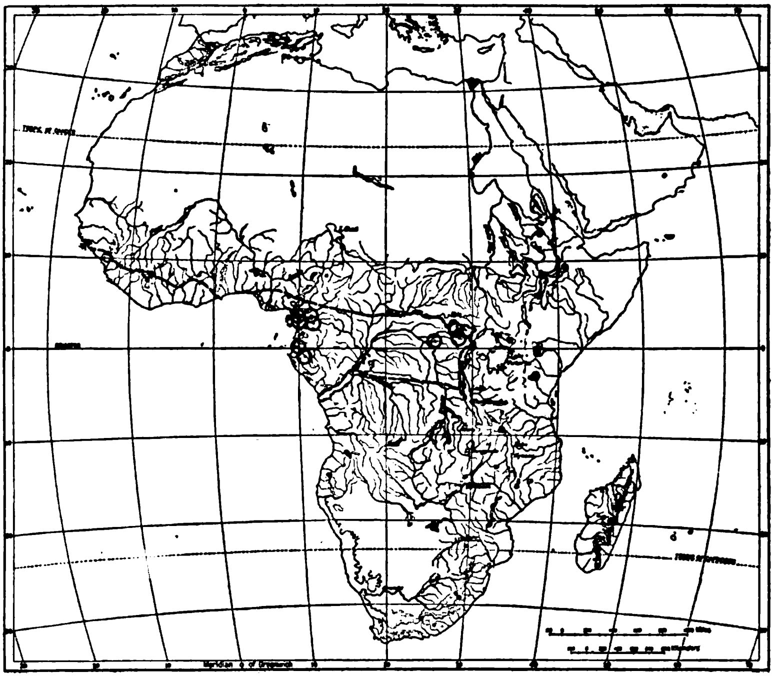
"The specimen from Panga was taken in a hollow tree, associated with bats and flying squirrels (Bull. A. M. N. H., XXXVII, p. 545)" [H. L.].

Hemidactylus richardsoni (Gray)

Plate XVII, Figure 1; Map 8

Velernesia richardsoni Gray, 1845, Cat. Lizards, p. 156.
Hemidactylus richardsoni Boulenger, 1885, Cat. Lizards, I, p. 143. Fischer, 1888, Jahrb. Hamburg. Wiss. Anst., V, p. 49, Pl. iv. Boulenger, 1900, Proc. Zool. Soc. London, p. 448. Mocquard, 1902, Bull. Mus. Hist. Nat. Paris, VIII, p. 410. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 670. Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 556.

There are ten specimens of this beautiful *Hemidactylus* from the Ituri Forest: A. M. N. H. Nos. 10281 (May 1914), 10282 (December 1913), and 10283–85 (September 1913) are from Avakubi; 10276–78 (September 1909), Bafwaboli; 10279 (May 1914) and 10280 (May–June 1914), Medje.



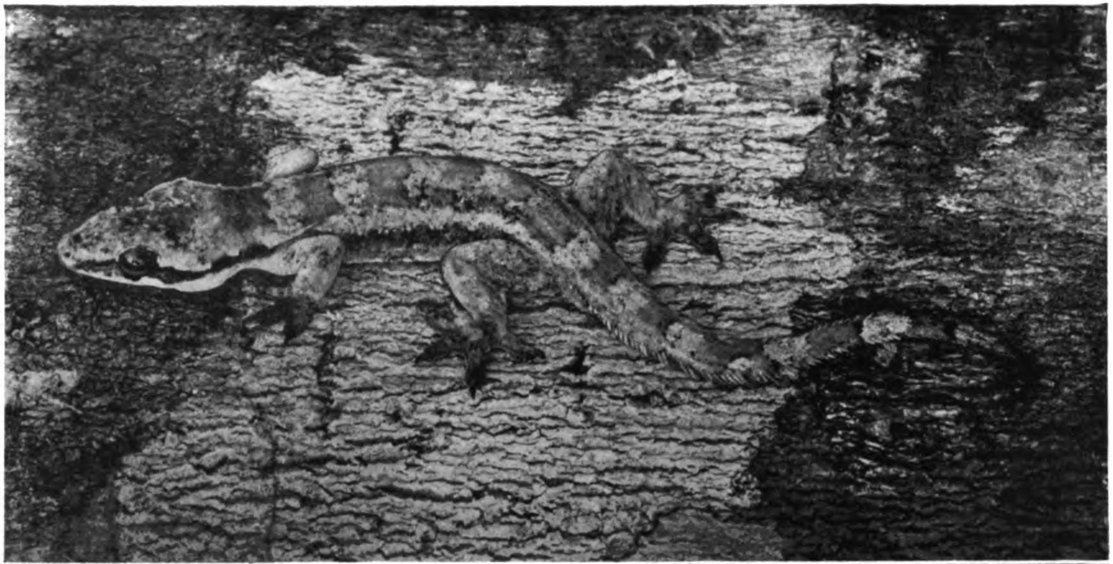
Map 8. Distribution of *Hemidactylus richardsoni*. A forest species, less abundant and more closely restricted to the continuous forest than *Hemidactylus fasciatus* (Map 7).

These specimens extend the range of this relatively rare species well through the Congo forest. It had been collected before only from various places in Kamerun and from Gaboon.

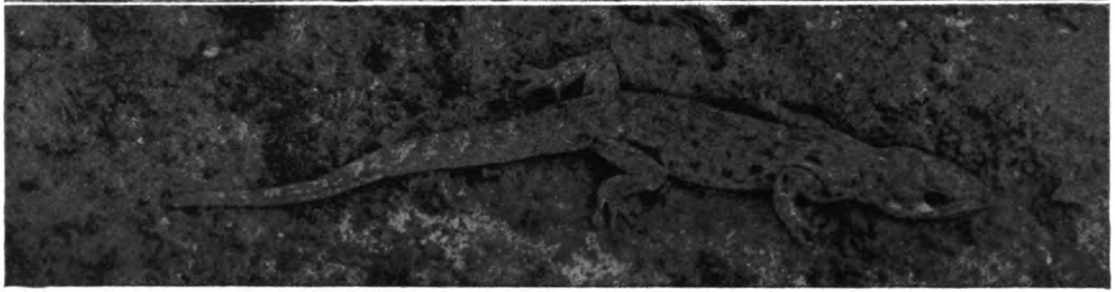
PLATE XVII

Figure 1. *Hemidactylus richardsoni* Gray. A rare forest gecko, protectively colored. A. M. N. H. No. 10279; ♀; length 130 mm.

Figure 2. *Lygodactylus depressus*, new species. A. M. N. H. No. 10342; ♀; length 72 mm.



1



2

Hemidactylus richardsoni has been described by Boulenger (1885, p. 143, Pl. XII, fig. 3) from the type; by Fischer (1888, p. 49, Pl. IV, fig. 10) from the next two specimens known (presenting some variations); and very well by Müller (1910, p. 556), who had ten specimens before him. Tornier (1902, p. 670) draws the correct conclusion that the dorsal marking is more vivid in the young. Little need be added to the discussion from the present series. The tubercles are uniformly present on the tail, and all the specimens have the dorsolateral rows of tubercles well developed, with two or more indistinct rows between. The enlarged sublabials (Fischer, *loc. cit.*) are rather well developed in all. The normal tail measures from .47 to .51 of the total length.

None show any trace of the three dorsal longitudinal lines described by Müller, nor have they the brown marking so vividly developed as is described for young specimens. The head pattern and dorsal cross-bands can be distinguished in the smaller specimens, the latter, as brown-dotted areas, in all of them. The postocular band is continued from the arm to the hind leg along the sides as a similar brown-dotted band, occupying the space between the dorsolateral tubercles and the lateral fold. Five or six cross-bands are more distinct on the tail. The limbs are brown-dotted above, the arms appearing to be barred. From the field notes, the colors in life are silvery gray above, with light and dark brown dorsal marks, postocular stripe, and cross-bands on the tail. The labials creamy white, the ventral surface gray with a yellow tinge; tubercles white. The statement that the living specimens change color explains the "obsolete" appearance of the markings in alcohol, though there can be little doubt that there is also a variation from juvenile to adult coloration.

Three specimens were taken from a brick wall, on which they ran with perfect ease, in the evening. One specimen fell from a tree. [L. and C.]

Measurements and Scale Characters

A. M. N. H. No.	10280	10276	10277	10278	10282	10279	10283	10281	10284	10285
Sex	♀	♀	♂	♀	♀	♂	♀	♂	♂	♂
Femoral Pores			22–24			23–23		22–21	22–22	21–22
Length	133	128	[145]		[125]	[130]	[113]	150	122	134
Body	70	64	68.5	50	76	69	69	73	64	66
Tail	63	64	[76.5]		[49]	[61]	[44]	77	58	68
Tail /Length	.47	.50						.51	.48	.51
Axilla to Groin	42	37	39	28	45	38	40	44	39	39
Snout to Arm	26	24	25	18	25	26	25	27	23	25
Arm	22	22	22	15	24	22	20	23	21	22
Leg	32	28	28	20	32	29	28	29	28	28

A. M. N. H. No.	10280	10276	10277	10278	10282	10279	10283	10281	10284	10285
Head Length	19	16	18	14	20	18	18.5	20	16.5	18
Head Breadth	15	14	15	12	16	14	14.7	15.5	13	13.5
Snout	8.	7.5	8.	6.	8.5	8	8	9	7.5	8
Ventrals, Transversely	60	72	70	68	70	66	62	64	62	64
Labials	$\frac{13-14}{10-10}$	$\frac{13-13}{10-10}$	$\frac{13-12}{8-10}$	$\frac{12-12}{9-10}$	$\frac{11-12}{9-10}$	$\frac{11-11}{9-9}$	$\frac{10-11}{9-10}$	$\frac{12-12}{9-9}$	$\frac{14-12}{9-10}$	$\frac{12-13}{9-10}$
Subdigital Lamellæ	$\frac{7-8}{7-9}$	$\frac{7-8}{6-9}$	$\frac{7-9}{6-9}$	$\frac{5-8}{6-8}$	$\frac{6-9}{6-9}$	$\frac{6-9}{6-9}$	$\frac{6-8}{6-9}$	$\frac{7-9}{6-9}$	$\frac{6-8}{6-9}$	$\frac{6-8}{6-10}$

Lygodactylus Gray

Key to the Species of *Lygodactylus* Occurring in the Rain Forest

A. Subcaudal scales small. Three species, South African, *ocellatus* Roux, *angolensis* Bocage, *capensis* Smith.
  B. Mental cleft behind, three-lobed; preanal pores 4–6. Gaboon.
capensis.
AA. Subcaudals enlarged, in two longitudinal rows.
fischeri.
AAA. Subcaudals transversely enlarged, a single median row.
  B. Habit slender; preanal pores 4; 2 lateral rows of ocelli.
conraui.
  BB. Habit stout; no ocelli; 3–4 scales between the enlarged nasals; throat with black chevrons........................*depressus.*

The species *picturatus, thomensis,* and *depressus* require comparative description. It is impossible to distinguish them by "key characters" from the existing literature; while the distinct ranges and habitats are partial evidence, at least, of their specific validity.

Lygodactylus picturatus gutturalis (Bocage)

Plate XIV, Figures 2 and 3; Map 9

Hemidactylus gutturalis Bocage, 1873, Jorn. Sci. Lisboa, IV, p. 211.

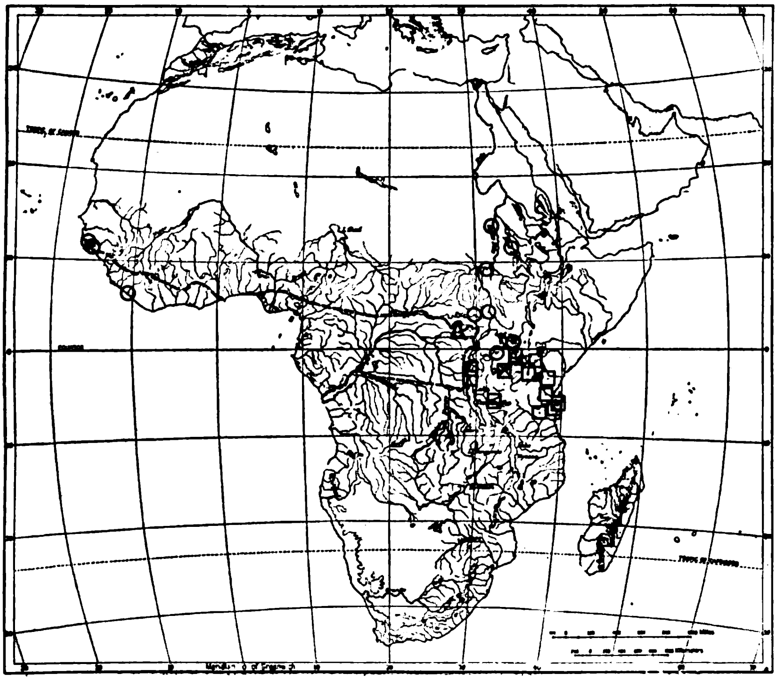
Lygodactylus gutturalis Boulenger, 1885, Cat. Lizards, I, p. 161. Günther, 1888, Proc. Zool. Soc. London, p. 50. Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 199; 1908, (3) IV, p. 5; 1911, (3) V, p. 162.

Lygodactylus picturatus (part) Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, III, p. 15.

Lygodactylus picturatus gutturalis Werner, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI, Abt. 1, p. 1833. Barbour, 1913, Proc. Biol. Soc. Washington, XXVI, p. 145.

Fifty-five specimens of this very distinct subspecies come from Garamba, on the watershed between the Uele and the Nile: A. M. N. H. Nos. 10286–10338 (May 1912) and 10339–41 (June 1912).

Günther (1888, p. 50) has recorded this form from "Monbuttu" (Mangbetu) Upper Congo, probably not far to the west of the present locality and doubtless to the north of the Rain Forest. Werner's records (1907, p. 1833) come from less than 150 miles to the northeast. From the records of recent years, *gutturalis* appears to be much more abundant in the eastern Sudan than in the type locality and it is probably a form of the eastern Sudan which has spread westward to the coast, following the more or less uniform habitat afforded by the open country north of the forest. Intermediate records, however, are lacking. The species should appear in Togo or the Kamerun "Hinterland." The distributional relationship with *L. picturatus picturatus* is close, as the latter is recorded from the lake region



Map 9. Distribution of *Lygodactylus picturatus* and *Lygodactylus depressus*.

☐ *Lygodactylus picturatus picturatus*. East African.

○ *Lygodactylus picturatus gutturalis*. Sudanese.

△ *Lygodactylus depressus*.

The ranges of the two subspecies of *picturatus* meet but do not overlap.

(Lake Kivu: Sternfeld, 1912, p. 205) and from the northeast and southeast corners of Victoria Nyanza, while Boulenger (1908, p. 5; 1911, p. 162) records *gutturalis* from Mbale, Uganda, and from the Sesse Islands in the northwest corner of Lake Victoria.

The tail length is rather variable, .47 to .62 of the total length, and, contrary to Werner's report (1907, p. 1834) on his series from the Sudan in which there were no broken tails, twenty-nine of the fifty-four here studied have broken or renewed tails. Perhaps the most remarkable feature of the tail renewal in this species is the attempt to renew the adhesive apparatus at the tip, which is flattened and slightly widened in well-renewed tails. The regular lamellæ of the tail are not reproduced, but irregular scales beneath the tip bear the minute "hairs,"[1] which characterize both caudal and digital lamellæ. This fact appears to indicate that the tail-disc is a phylogenetically well fixed character in the genus. There are two postmentals immediately behind the mental in forty-four of the fifty-four specimens, the other ten specimens having three. The lamellæ of the widened portion of the toes are very constantly four or five in number. Two female specimens have preanal pores (seven in one, eight in the other), or at least the appearance in that the enlarged preanal scales are perforate.

Werner (1907, p. 1834) has given a very satisfactory description of the color of this subspecies, and, with all its variation in shade and tint, the pattern appears to be fairly constant.

The ovaries of three specimens collected in May and June contained 1 + 1 eggs, 5 to 6 mm. long. An egg (No. 10340), probably belonging to *Lygodactylus gutturalis*, was found May 1912 on the ground in company with an embryo or newly hatched young and an adult of this species at Garamba. This egg was 8 × 6 mm. and its shell was hard, discolored white, with circular mass of extra shell matter at one end.

Of six stomachs examined, five contained membracids and a sixth an ant and a small spider.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	18	54–78	67.6 mm.
	♀	8	60–73	66.9 mm.
Body	♂	34	26–36	33.1 mm.
	♀	20	27–38	34.1 mm.
Tail	♂	18	28–41	36.5 mm.
	♀	8	31–35	33.1 mm.

---

[1] These are not visible until the scales in question are partly dry, when they are very distinct under the microscope.

	Sex	No. of Specimens	Extremes	Average
Tail/Length	♂	18	.50–.54	.52
	♀	8	.47–.53	.50
Axilla to Groin	♂	34	13–22	18.3 mm.
	♀	20	14–23	19.2 mm.
Arm	♂	34	9–14	12.4 mm.
	♀	20	10–13	11.6 mm.
Leg	♂	34	11–19	15.9 mm.
	♀	20	13–17	14.8 mm.
Head Length	♂	34	7–10	8.4 mm.
	♀	20	7.7–9.5	8.7 mm.
Ventrals, Transversely	♂	34	20–28	21.0
	♀	20	22–28	25.0
Preanal Pores	♂	34	6–9	7.1
Subcaudal Lamellæ	♂, ♀	26	5–7	6.0

"A remarkable little arboreal gecko seldom more than three inches (76 mm.) long, with two color phases, dark and light, both broken up by irregular, dusky mottlings resembling the general appearance of the bark of trees in its habitat. Three arrow-shaped black lines on the throat and the yellowish venter (Plate XIV, Figs. 2 and 3) are typical of this species, but the really unique feature distinguishing it from all other geckos is the adhesive pad on the tip of the tail, formed again, as Mr. Schmidt points out, in regenerated tails. In the savannah the great thickness of the rough bark of many trees protects them from destruction by annual grass fires, and for a time the charred condition makes climbing difficult for so small a species, for even the widened lamellar pads near the claws often cannot adhere to such ash-covered or dusty surfaces. An adhesive apparatus at the end of the strong, muscular, flexible tail, capable of supporting the whole weight of the body in any position, is of course of extraordinary advantage. It was no small surprise to see so typical an arboreal form living on the ground; nearly all of the fifty-five specimens were found hiding near the earth, sometimes clinging upside down to pieces of wood; but the reason for this change in habitat is easily explained. In May and June, the beginning of the rainy season, the Mondo and Baka plant their fields. Some time before, they clear large patches of brush and former plantations, piling heaps of the cumbersome rubbish, which is burned when dry. The many tiny creatures living in this scrub are thus thrown together and others are attracted by such accumulations, true also of the few reptiles which prey upon them. In these regions dead vegetable matter is otherwise scarce and it seems natural that so alert and agile a gecko, accustomed to daylight, should come in numbers to profit by an increase in food, which is more varied than that of any of its relatives and includes several diurnal forms of great activity. Spiders, termites, ants, tiny wasps, flies, various beetles, bugs, and the larvæ of some of the last three mentioned were taken" [H. L.].

Lygodactylus depressus, new species

Plate XVII, Figure 2; Map 9

Five specimens of *Lygodactylus* from the Ituri Forest, though differentiated with some difficulty, require special description: A. M. N. H. Nos. 10342 (April 1914), 10343 (May 1914), and 10344–46 (May–June 1914) are from Medje.

The distribution of several species of this genus, with the type locality of the present form, which is the only one so far recorded from the eastern part of the Rain Forest, is shown on Map 9.

Diagnostic Characters

Subcaudals transversely enlarged; habitus stout, depressed; head flat; orbits little raised. Venter immaculate, throat with V-shaped black markings. Dorsum mottled bluish gray and black. Three to four scales between the enlarged nasals. Seven preanal pores.

Detailed Description

Type: A. M. N. H., No. 10345, ♂.

Strikingly different in habitus from the preceding species; body more flattened, head more depressed, and legs shorter. Snout without distinct *canthus rostralis*. Diameter of eye contained in length of snout twice. Orbits scarcely raised above the general contour of the head. Tail .51 of the total length.

Dorsal granular scales somewhat smaller than in *Lygodactylus picturatus gutturalis*. Scales on upper side of tail flat, imbricate. Ventrals imbricate, twenty-six in a transverse row. Subcaudals transversely widened. Nostril bounded by the first labial and three nasals, a large anterior and two very small posterior. Four small scales between the anterior nasals. Postmentals, three. Labials, seven above and below. The lamellæ of the digital expansions of the fingers and toes, five. Subcaudal lamellæ, eight.

Coloration dark bluish gray, irregularly mottled with black, more heavily anteriorly. A dark mark from eye to eye, and a second across the snout. Tip of snout, black. An indistinct line through the eye to the shoulder. Venter and enlarged subcaudals immaculate yellow in life — an apparently constant distinction from *Lygodactylus picturatus gutturalis*. Throat with two V-shaped, narrow, black marks, enclosing a third median spot.

Chevrons of the throat equally distinct in the female (only two V's in three of the paratypes) narrower than in *gutturalis*. Postmentals three in three of the specimens, two in the two remaining. Series otherwise relatively uniform.

The relation of this species with *L. picturatus picturatus* (Peters) appears to be close; its coloration is in some respects similar but does not seem to fall within the wide variation described by Tornier (1897, pp. 15–24). The peculiar, flattened body, with its shorter hind legs, seems to be the most distinctive character.

Measurements and Scale Characters

A. M. N. H. No.	10343	10342	10344	10346	10345
Sex	♂	♀	♂	♂	♂
Preanal Pores	7		8	7	7
Length		72	74	[78]	78 mm.
Body	36	35	36	38	38 mm.
Tail		37	38	[39]	40 mm.
Tail/Length		.51	.51		.51
Axilla to Groin	20	20	20	20	22 mm.
Snout to Arm	14	13.5	13.5	15	14 mm.
Arm	13	12	13	12	13 mm.
Leg	15	15	14	15	15 mm.
Head Length	9.5	9.6	9.0		10.0 mm.
Head Breadth	7.6	6.5	7.0		7.5 mm.
Snout	4.6	4.5	4.5		5.0 mm.
Postmentals	2–5	3–5	3–5	2–5	3–5
Ventrals, Transversely	26	28	25	26	26
Labials	$\frac{7-8}{7-7}$	$\frac{7-7}{7-7}$	$\frac{7-7}{7-7}$	$\frac{7-7}{7-7}$	$\frac{7-7}{7-7}$
Subcaudal Lamellæ		6	7		8

"The coloration is changeable in life. One specimen was entirely black when caught, turning bluish gray when injected. One specimen was taken under the bark of a fallen tree" [H. L.].

AGAMIDÆ

Agama Daudin

The three species of *Agama* found in the Rain Forest are readily distinguished as follows:

A. Lepidosis homogeneous............................*A. colonorum.*
AA. Lepidosis heterogeneous, large scales intermixed with smaller ones on the dorsum.
  B. Snout broad, obtuse; enlarged dorsal scales relatively few, not crowded at the mid-dorsal line. (Kamerun)......*A. mehelyi.*
  BB. Snout pointed; enlarged dorsal scales more numerous, crowded along the vertical line. (Ituri).................*A. atricollis.*

"The dull, usually keeled, or spinous, scales are a noteworthy feature in these common and rather wary lizards, the males of which become 13 inches (330 mm.) in length. Apart from the slight nuchal crest and the small clusters of spikelets around the ear and on the side of the neck, the disposition of nearly all the highly modified scales indicates that they are of some assistance in progress. One readily observes that the great ease and confidence with which they move up or down rocks and tree trunks depend more on the specialized scales on the lower surface of the toes than on the claws; the spinous scales along the sides of the body, the limbs, and especially the tail must be equally helpful at times.

"Two species of *Agama* are represented in the collection: *A. colonorum*, chiefly inhabiting the moist West African forest, and *A. atricollis*, the dry East and South African savannah; both require open, sunny places and in the greater part of their habitat naturally depend on and shift with human settlements. The presence of the East African *A. atricollis* in the Ituri Forest nearly as far north as the Uele watershed is attributable to the caravan traffic of the Arabs in former times. The two species of *Agama* are among these lizards which often creep into porters' loads, which partly accounts for their extended distribution. Their liveliness and intense coloration depend on sunshine, and even a slight rain sends them to their hiding places; in fact, the genus *Agama*, common in Africa and Asia, is absent from all the cooler parts of the Palearctic Region and, curiously, also from Madagascar. Refuge is sought in any suitable spot provided by nature and in or near human settlements, not for the sake of darkness but for protection from moisture, especially the heavy dewfall that in those regions often exceeds the frequent showers of rain. Then the males lose their quarrelsome spirit, the gregarious instinct gains the upper hand, and all sizes huddle together; when picked up, stiff and inert, they show no readiness to bite.

"The two species present no particular dissimilarity in habits and both are extremely wary and quick to evade capture. Like some squirrels they always dodge from view and, especially when perched in a tree, escape on the side turned away from the observer. During the greatest heat of the day, the more active, brighter colored adult males love to exhibit themselves in solitary splendor, always in places flooded with sunshine, and their colors appear so much more gorgeous under the direct influence of the sun; fences, stone piles, tree trunks, and the perpendicular stems of palms are equally attractive. They may remain motionless, but often perform the well-known, peculiar nodding motion.

"Color differences in adult males of *A. colonorum* deserve more careful study. In the Lower Congo we found the head bright reddish brown, in the Ituri yellowish, and from the Gold Coast come records of flamescarlet. The males of *A. atricollis* have bright blue on body, head, and part of the tail (Pl. XVIII).

"The tables (pp. 476, 479) compiled by Mr. Schmidt clearly show that in the two species recorded the males are somewhat larger than the females, a fact even more noticeable in the field. The relative slenderness, dull coloration, and less bold movements of the latter distinguish them from even young males, which, like many of the females, bear a dark irregular pattern on the back, limbs, and part of the tail. *A. colonorum* attains its greatest length, 13.08 inches (332 mm.), in the Rain Forest, is smaller in the Lower Congo, 12.32 inches (313 mm.), and still smaller in the Sudan, 11.25 inches (286 mm.). The regular and abundant food supply in the Rain Forest, where there is practically no dry season, offers more ideal conditions than in the arid Sudan, and may account for the chief differences in size. The agility and powerful dentition enables them to feed on all sorts of insects; beetles, bugs, roaches, grasshoppers, ants, and even bees are quickly dispatched, and caterpillars, snails, and pillbugs are occasionally taken. I saw a male *A. colonorum* kill a huge grasshopper nearly four inches long with two bites and frighten off a chicken ready to dispute the prey by showing its readiness to attack.

"Men and children of the Mangbetu and other tribes of the Ituri and Uele districts do not refrain from eating this lizard. The head of a male, considered a powerful aphrodisiac by some, is always removed, and when dried is worn as an amulet; if immediate effects are desired the head is charred and powdered, and taken with plenty of banana wine" [H. L.].

Agama colonorum Daudin

Plate XVIII, Figure 2; Map 10

Agama colonorum DAUDIN, 1830, Hist. Nat. Rept., III, p. 356. GRIFFITH, 1831, Cuvier's Animal Kingdom, IX, p. 123. DUMÉRIL and BIBRON, 1837, Erpétol. Gén., IV, p. 489. DUMÉRIL, 1861, Arch. Mus. Hist. Nat. Paris, X, p. 176. STEINDACHNER, 1870, Sitzber. Akad. Wiss. Wien (math.-natur.), LXII, part 1, p. 330. REICHENOW, 1874, Arch. Naturg., XL, part 1, p. 295. BOETTGER, 1881, Abh. Senck. Ges., XII, p. 407. BOULENGER, 1885, Cat. Lizards, I, p. 356. BOETTGER, 1887–1888, Ber. Senck. Ges., p. 22. STEJNEGER, 1893, Proc. U. S. Nat. Mus., XVI, p. 717. BOCAGE, 1895, Herpétol. Angola, p. 17. BOULENGER, 1895, Ann. Mag. Nat. Hist., (6) XVI, p. 167. TORNIER, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 29. SJÖSTEDT, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 13. WERNER, 1897, Verh. Zool. Bot. Ges. Wien, XLVII, p. 397. BOULENGER, 1898, Ann. Mus. Stor. Nat. Genova, (2) XVIII, p. 717. WERNER, 1899, Verh. Zool. Bot.

Ges. Wien., XLIX, p. 133. Boulenger, 1900, Proc. Zool. Soc. London, p. 448. Tornier, 1900, Zool. Jahrb. (Syst.), XII, p. 589. Lampe, 1901, Jahrb. Nassau. Ver. Naturk., LIV, p. 205. Tornier, 1901, Beiheft, Arch. Naturg., LXVII, p. 72; 1901, Zool. Anz., XXIV, p. 61, Johnston, 1902, Uganda Protectorate, I, p. 445. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 672. Werner, 1902, Verh. Zool.-Bot. Ges. Wien, LII, pp. 333, 336, 342. Peracca, 1904, Boll. Mus. Torino, XIX, No. 467. Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 200. Tornier, 1905, Zool. Jahrb. (Syst.), XXII, p. 371. Neumann, 1905, Zool. Jahrb. (Syst.), XXII, p. 392. Johnston, 1906, Liberia, II, pp. 814, 833, Pl. Werner, 1907, Sitzber. Akad. Wiss. Wien, (math.-natur.), CXVI, part 1, p. 1889. Pellegrin, 1909, Bull. Mus. Hist. Nat. Paris, XV, p. 413. Roux, 1910, Rev. Suisse Zool., XVIII, p. 95. Meek, 1910, Publ. Field Mus. Zool., VII, p. 407. Nieden, Fauna Deutschen Kolonien, Reihe I, Kamerun, Heft 2, p. 16. Peracca, 1910, in Il Ruwenzori, p. 2. Boulenger, 1911, Ann. Mus. Stor. Nat. Genova, (3) V, p. 162. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, pp. 199, 207. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 69. Klaptocz, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 281. Lamborn, 1913, Proc. Zool. Soc. London, p. 218. Werner, 1913, in Brehm's Tierleben, 4th Ed., V, p. 43. Boulenger, 1914, Rept. and Batr., p. 60.

Agama colonorum congica Peters, 1877, Monatsber. Akad. Wiss. Berlin, p. 612.

Agama occipitalis Gray, 1831, Synopsis, p. 56, in Griffith, Cuvier's Animal Kingdom, IX. Gray, 1845, Cat. Lizards, p. 256.

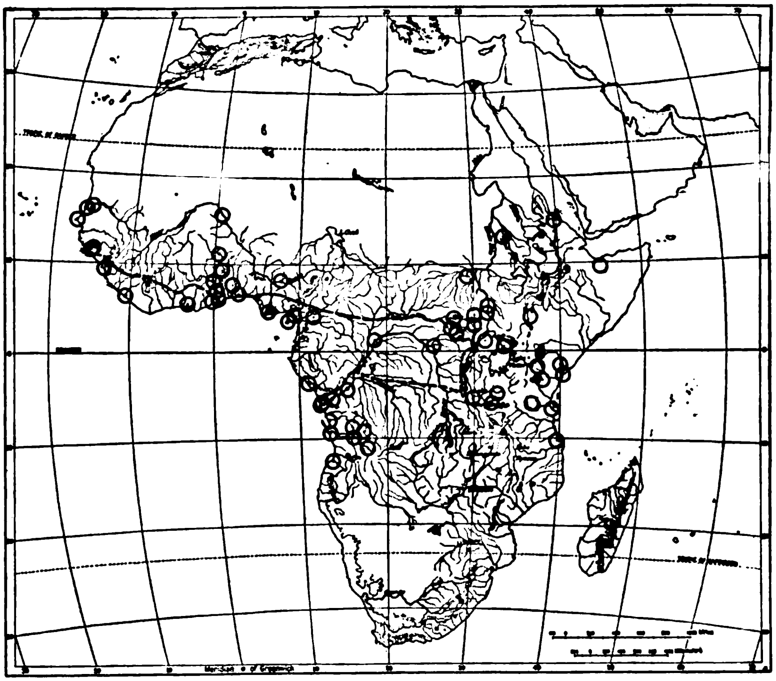
Agama picticauda Peters, 1877, Monatsber. Akad. Wiss. Berlin, pp. 612, 620.

The involved early synonymy of this species has been dealt with by Duméril and Bibron (1837, p. 489). In recent years the status of *Agama hartmanni* Peters (1869, Monatsber. Akad. Wiss. Berlin, p. 65) and of *Agama doriæ* Boulenger (1885, Ann. Mus. Stor. Nat. Genova, (2) II, p. 13) with relation to *colonorum* has been questioned. A summary of the somewhat voluminous discussion is offered herewith. Anderson (1898, Zool. Egypt, I, p. 119), after examination of the type of *doriæ* and of photographs and descriptions of the unique type of *hartmanni*, very convincingly argues that the species are identical. Tornier (1905, p. 37) however, dealing with specimens from northeastern Africa, reaffirms the distinctness of *doriæ*, evidently after comparison with the type of *hartmanni*, and Neumann (1905, p. 391) points out the distinctness of the habitat of *doriæ* and *colonorum* in the same region. Werner (1907, p. 1836) adopts a provisional standpoint but argues that, if *doriæ* were identical with *hartmanni*, both must belong to *colonorum*, from consideration of the geographical relationships and the fact that *doriæ* is in any case very closely related to *colonorum*. Barbour, (1913, Proc. Biol. Soc. Wash., XXVI, p. 146) has overlooked the subjunctive in Werner's paper, and is puzzled as to his meaning; and, although Werner's position seems clear enough to the writer, Nieden (1913, p. 69) also misunderstands his provisional standpoint, for he quotes him as uniting *doriæ* and *colonorum* outright. Nieden adds clarity to the discussion by referring all of the so-called *doriæ* from German East Africa to *colonorum*, restricting *doriæ* to the Abyssinian highlands. The problem is thus freed, in part, from the geographical considerations of Werner and, although the difference on which *doriæ* is based is still slight, there seems no reason for doubting its validity. There remains only the fact that the reestablishment of *doriæ* has proceeded without examination of the type and, until the identification of the *doriæ* of the German herpetologists with that of Boulenger is made certain and the status of *hartmanni* is settled by an examination of both types by the same herpetologist, the question cannot be considered definitely closed.

Of this species 134 specimens were collected: A. M. N. H. Nos. 10465–66 (April 1913) are from Bafuka; 10379–80 (August 1915), Banana; 10467–80, Belgian Congo; 10451–52 (February 1911), 10453–54 (February 1912), 10454*a* (September 1912), Faradje; 10386 (January 1910), Gamangui; 10455–60 (March 1910), Garamba; 10348–51, 10382 (July 1909), Leopoldville; 10358–78 (July 1915), Malela; 10357 (June 1915), Matadi; 10387–92 (January 1910), 10393–95 (March 1910), 10396–403 (April–May 1910), 10404 (June 1910), 10405–7 (September 1910), 10408–11 (April 1914), 10412–23 (June 1914), Medje; 10428–49 (November 1910), 10450 (April 1913), Niangara; 10425 (November 1913), Niapu; 10381 (July 1909), Nouvelle Anvers; 10426–27 (September 1914), Panga; 10424 (August 1913), Poko; 10383 (August 1909), 10384 (October 1914), 10385 (December 1914), Stanleyville; 10347 (July 1909), Thysville; 10461–64 (November 1911), Yakuluku; 10352–56 (June 1915), Zambi.

The localities add connecting links in the known range of the species. From the Lower Congo it had previously been reported from Banana (Boettger, 1888, p. 22). The Sudanese records are approached on the northeast by Werner's from Mongalla and Gondokoro. The species had not previously been recorded from the Ituri Forest and it appears to be absent from the eastern portion, being replaced at Avakubi by the following species (*Agama atricollis*). Abundant in Uganda, it was not taken in the region to the south by the Deutsch. Zentral Afrika Expedition (Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV). From the general distribution and the preference of the species for clearings, this appears to be a Sudanese form which has invaded the forest and spread far south of it on the West Coast. The range overlaps that of *Agama atricollis* in German East Africa.

The variations observable in the series are moderate. A constant difference in the coloration of the adult males from the Lower Congo and the Ituri and Uele regions is reported by Messrs. Lang and Chapin, in that the rusty red head of Lower Congo specimens is yellowish green in the eastern representatives. The well known color change in this species does not account for the difference, as that was also observed. (One specimen from the forest is recorded as having a brown head.) Werner (1907, p. 1840), giving a very clear account of coloration in this species, records the head coloration of the adult males as bright lemon-yellow; and Steindachner (1870, p. 330) describes the same coloration in Senegambian specimens. Sternfeld (1912, p. 207) describes specimens from Kibwezi, British East Africa, as having a yellow head. The red head-color of West African specimens, south of Senegambia, is reported by Johnston (1906, p. 814) from Liberia; from the Gold Coast by Reichenow (in Werner, 1913, p. 43); from Kamerun by Sjöstedt (1897, p. 13), and Nieden (1910, p. 16); and from the Lower Congo by the present expedition. Records of a yellowish head in breeding males from the latter region (as Boettger, 1888, p. 22) may usually



Map 10. Distribution of *Agama colonorum*. Probably a Sudanese species, everywhere invading the forest clearings and plantations.

be explainable as taken from alcoholic specimens, but such a coloration in life is mentioned as rare by Pechuel-Lösche (in Werner, 1913, p. 43) from localities on the Loango Coast.

The difference suggested by Stejneger (1893, p. 717) of fewer spines in the nuchal crest in eastern specimens does not appear in the present series. The only scale character which appears to be in any way definite and related to locality is the higher number of canthal and supraciliary scales ("canthals") in the Lower Congo specimens, 7–9 in place of 6–8. The average number of scale rows about the body seems also somewhat higher in these, 70, as compared with 64 (forest specimens) and 68 (Sudanese specimens).

The coloration of males from Leopoldville, according to the field notes, is dorsally dark gray to bright blue; head and a posteriorly directed median V-shaped mark on the shoulder-region, bright rusty red; tail grayish at base followed by light rusty red (tip dark); venter yellowish; throat yellowish with dusky network. The females in the Upper Congo region show a very variable brownish red pattern on the gray dorsal ground color. The old males are dark gray above, tinged with blue; head, lips, and nuchal V-shaped mark grayish or yellowish green; shoulders and fore limbs dark gray-blue; throat and venter greenish gray, throat often with dark reticulation. The more brightly colored males exhibit an orange-red throat, mottled with dark, and have the posterior half of the tail also orange-red. It may be added that the ventral coloration in alcohol of both sexes is variable, but often entirely dark (blue in life?) in the males.

A single specimen (No. 10404) has the lower labials anterior to the eye fused.

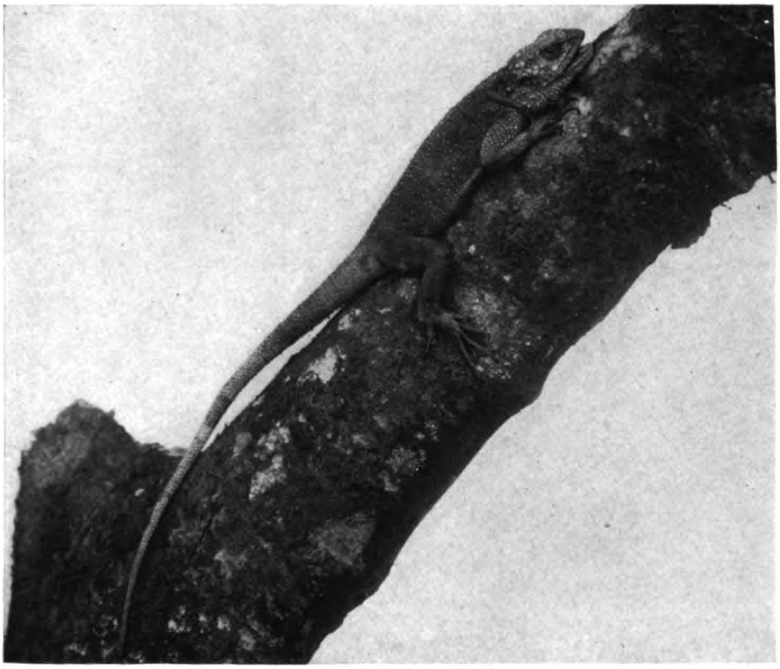
The ovaries of four specimens from the Lower Congo (July and August 1915; Nos. 10369, 10372, 10378 and 10379) contained many small eggs, maximum about 1 mm. One specimen from the Sudan (September; No. 10454*a*) contained many undeveloped eggs, maximum 1 mm.; and two others (November 1910; Nos. 10438 and 10461), numerous eggs, maximum 5 mm. Specimens from the Forest were as follows: No. 10406 (September 1909), numerous eggs, maximum 5 mm.; No. 10393 (March 1909), 8 eggs, (3 × 5), about 19 × 11 mm., with numerous undeveloped ones, four reaching 4–5 mm. in diameter, others 1–2 mm.; No. 10399 (May 1909), 8 eggs, (4 × 4) nearly round, about 9 mm. in diameter, with many small undeveloped ones; No. 10421 (June 1914), 8 eggs, (4 × 4) 19 × 10 mm., extending far forward in the body cavity; No. 10422, 7 eggs (4 × 3) about 16 × 8 mm. If the breeding season is the same in the Ituri region as at the coast, the eggs must be laid from April to June.

Parasitic worms are very frequent. Besides those noted in the stomach contents, specimens were observed in which these worms were apparently

Plate XVIII

Figure 1. *Agama atricollis* Smith. A. M. N. H. No. 10489; ♂; length 330 mm.

Figure 2. *Agama colonorum* Daudin. A. M. N. H. No. 10408; ♂; length 303 mm.



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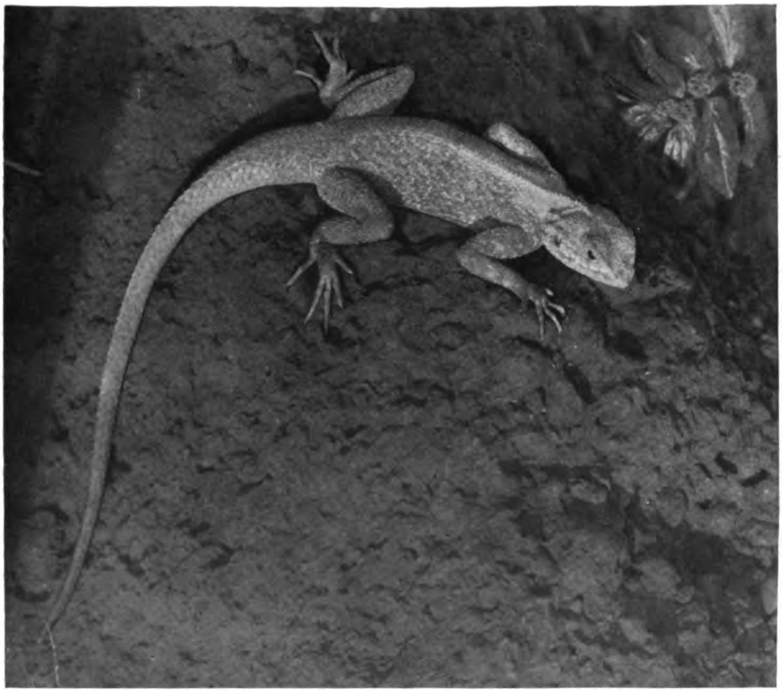

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boring their way through the stomach wall, and several had masses of them in the mesentery outside the stomach.

A female from Banana, No. 10379, with undeveloped eggs has the internal organs entirely enclosed by a layer of fat, greatly distending the body, much as if gravid.

The stomachs from the Lower Congo contained parasitic worms (Nos. 10361, 10364, 10369, 10377, 10378), remains of a cockroach (No. 10368), grasshoppers (Nos. 10377, 10378), neuropteron wings (No. 10378), trichopteron wing (No. 10370), homopteron fragments (No. 10379), heteropteron remains (No. 10362), a caterpillar (No. 10362), beetles (Nos. 10362, 10364, 10368, 10377, 10378), ichneumonid wing (No. 10379), chalcid wing (No. 10378), ants (Nos. 10361, 10362, 10364, 10368, 10369, 10370, 10372, 10377, 10378, 10379), bees (Nos. 10372, 10369 wings and legs of a small *Ceratina*, 10378 head of a *Trigona*).

The stomachs from the Sudan contained parasitic worms (Nos. 10432, 10438), beetles (No. 10471), ants (Nos. 10432, 10434 remains of several species of workers), bees (No. 10438 remains of the honey bee *Apis mellifica*, a wing certainly of that species).

The stomachs from the Forest specimens contained pieces of land snails (Nos. 10419 *Subulina*, and 10422 old pieces which were certainly dead when the lizard swallowed them), isopods (No. 10419), insect larvæ (No. 10399), cockroach (No. 10414), Heteroptera (Nos. 10393, 10401 a large green one, 10415), a caterpillar (No. 10422), beetles (Nos. 10399, 10419), ants (Nos. 10393, 10399, 10408 a black-winged and two heads of a smaller red ant, 10415, 10419, 10422), bees (Nos. 10399 the hind leg and wing of a *Nomia* and 10422 a large *Megachile*).

Summary of Measurements and Scale Characters of Agama colonorum *Daudin*

		SUDAN			FOREST			LOWER CONGO		
	Sex	No. of Specimens	Extremes	Average	No. of Specimens	Extremes	Average	No. of Specimens	Extremes	Average
Length	♂	24	197–286	239.6	26	188–332	270.1	19	176–313	267.8 mm.
	♀	10	129–218	186.6	16	150–258	220.5	10	190–254	221.7 mm.
Body	♂	27	75–115	94.9	26	70–122	103.0	20	66–117	99.1 mm.
	♀	12	48–93	71.5	17	53–101	86.9	12	70–93	81.7 mm.
Tail	♂	24	122–171	144.4	26	118–210	166.9	19	110–200	174.7 mm.
	♀	10	81–126	111.8	16	97–157	133.7	10	110–155	141.1 mm.
Tail/Length	♂	24	.58–.62	.602	26	.60–.63	.616	19	.58–.65	.63
	♀	10	.56–.63	.602	16	.56–.65	.607	10	.57–.66	.63
Axilla to Groin	♂	27	43–67	54.8	26	41–75	60.7	20	32–70	56.6 mm.
	♀	12	29–58	42.7	17	29–62	52.8	12	42–58	47.5 mm.
Arm	♂	26	37–52	46.0	26	37–59	50.7	20	37–58	49.3 mm.
	♀	12	29–58	42.7	17	30–50	44.0	12	38–47	43.6 mm.
Leg	♂	26	54–73	65.0	26	50–85	72.8	20	50–81	71.2 mm.
	♀	12	36–62	50.5	17	43–72	62.4	12	58–69	61.8 mm.
Head Length	♂	27	19.0–27.5	23.8	26	17–30	24.5	20	18–30	25.1 mm.
	♀	12	13.0–24.0	18.8	17	14.6–25.0	21.5	12	19–24	21.5 mm.
Head Breadth	♂	27	15.0–21.0	18.1	26	13–22	18.6	20	13–23	18.6 mm.
	♀	12	10.5–17.0	14.3	17	12–19.5	16.5	12	14–19	16.2 mm.
Scales about Body	♂	27	60–74	67.9	26	58–70	63.1	20	62–78	69.8
	♀	12	55–80	67.1	20	58–78	65.1	14	62–90	70.5
Canthals	♂	27	6–8	7.0	26	6–8	7.1	20	7–9	7.8
	♀	12	6–8	6.9	20	6–8	7.0	14	7–9	8.0

Agama atricollis Smith

Plate XVIII, Figure 1; Map 11

Agama atricollis Smith, 1849, Ill. Zool. S. Africa, III, Appendix, p. 14. Boulenger, 1885, Cat. Lizards, I, p. 358. Dollo, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 153. Boulenger, 1892, in Distant, Naturalist in the Transvaal, p. 174. Günther, 1892, Proc. Zool. Soc. London, p. 555. Jeude, 1895, Notes Leyden Mus., XVI, p. 228. Johnston, 1897, British Central Africa, p. 361. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 29; 1900, Zool. Jahrb. (Syst.), XIII, p. 589. Boulenger, 1902, Proc. Zool. Soc. London, II, p. 16; 1902, in Johnston, Uganda Protectorate, I, p. 445. Mocquard, 1902, Bull. Mus. Hist. Nat. Paris, VIII, p. 405. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 582. Boulenger, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 110; 1904, Mem. Proc. Manchester Lit. Philos. Soc., LIII, part 3, No. 12, p. 7. Roux, 1907, Zool. Jahrb. (Syst.), XXV, p. 416; 1907, Rev. Suisse Zool., XV, p. 82. Boulenger, 1908, Ann. Mus. Stor. Nat. Genova, (3) IV, p. 5. Chubb, 1908, Ann. Mag. Nat. Hist., (8) II, p. 221. Odhner, 1908, Ark. Zool. Stockholm, IV, No. 18, p. 3. Boulenger, 1909, Trans. Zool. Soc. London, XIX, p. 242. Chubb, 1909, Proc. Zool. Soc. London, p. 593. Boulenger, 1910, Ann. S. African Mus., V, p. 466. Lönnberg, 1910, in Sjöstedt, Kilimandjaro-Meru Exp., I, part 4, p. 5. Meek, 1910, Publ. Field Mus. Zool., VII, p. 408. Roux, 1910, Rev. Suisse Zool., XVIII, p. 96. Boulenger, 1911, Ann. Mus. Stor. Nat. Genova, (3) V, p. 162. Sternfeld, 1911, Mitt. Zool. Mus. Berlin, V, pp. 416, 419; 1912, Sitzber. Ges. Naturf. Freunde Berlin, p. 385; 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 208.

Agama atricollis Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 70.

Stellio capensis Duméril, 1851, Cat. Méth. Rept., p. 106; 1856, Arch. Mus. Hist. Nat., Paris, VIII, p. 579.

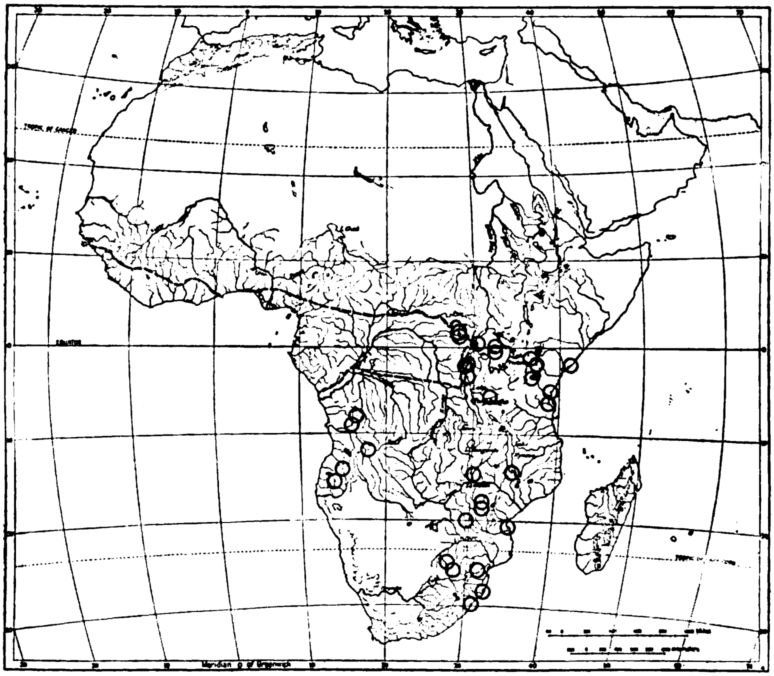
Stellio nigricollis Bocage, 1866, Jorn. Sci. Lisboa, I, p. 43; 1879, Jorn. Sci. Lisboa, VII, p. 95. Peters, 1881, Sitzber. Ges. Naturf. Freunde Berlin, p. 147. Bocage, 1895, Herpétol. Angola, p. 22.

Agama gregorii Günther, 1894, Proc. Zool. Soc. London, p. 86. Boulenger, 1894, Proc. Zool. Soc. London, p. 723. Günther, 1895, Ann. Mag. Nat. Hist., (6) XV, p. 523.

There are thirteen specimens: A. M. N. H. Nos. 10281–86 (October 1909), 10487 (November 1909), 10488 (December 1909), 10489 (September 1913), 10490–92 (August 1914) are from Avakubi; 10493 (January 1910), Bafwabaka.

The distribution of *A. atricollis* closely parallels that of many species in other groups and accords almost exactly with the botanical subdivision of South and East Africa. The extension of its range into the eastern Ituri Forest may be analogous to the spread of *A. colonorum* into the forest from the north. The species has been recorded as abundant in the lake region immediately to the east of Avakubi (Sternfeld, 1912, p. 208). The absence of *A. colonorum* in this region has been noted above.

There have been available for comparison with the present series two specimens of *A. atricollis* from the Durban Museum, Natal; and, through the kindness of Dr. L. Stejneger, the writer has been enabled to examine a series of specimens of this species from British East Africa, collected by the Roosevelt Expedition.



Map 11. Distribution of *Agama atricollis*. A species of the Eastern and Southern Subprovince invading only the eastern Ituri Forest.

The nostril is laterally directed, not or very slightly tubular, and just below the canthus. The only notable structural difference between the Ituri specimens and those from South Africa is the homogeneous squamation of the anterior sides of the limbs in the former, strongly heterogeneous in the latter. The East African specimens appear to be intermediate in this respect. The ventral scales are keeled to a variable degree (Tornier, 1897, p. 29). Keels appear most frequently anterolaterally, developed to a diminishing extent toward the median line and posteriorly.

The black shoulder mark of the South African specimens is indistinct in the males of the present series, and a comparison of the colors in life should be of interest.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	6	314–337	330.0 mm.
	♀	6	255–298	280.1 mm.
	Juv.	1		97.0 mm.
Body	♂	6	110–124	116.5 mm.
	♀	6	90–105	98.6 mm.
	Juv.	1		34.0 mm.
Tail	♂	6	204–219	213.5 mm.
	♀	6	165–196	181.5 mm.
	Juv.	1		63.0 mm.
Tail/Length	♂	6	.63–.65	.647
	♀	6	.63–.65	.643
	Juv.	1		.65
Axilla to Groin	♂	6	62–72	67.8 mm.
	♀	6	53–65	60.3 mm.
	Juv.	1		18.0 mm.
Arm	♂	6	57–61	58.8 mm.
	♀	6	50–54	51.8 mm.
	Juv.	1		20.0 mm.
Leg	♂	6	78–88	82.0 mm.
	♀	6	68–75	70.8 mm.
	Juv.	1		27.0 mm.
Head Length	♂	6	30–34	32.0 mm.
	♀	6	25.5–28	26.3 mm.
	Juv.	1		11.0 mm.
Head Breadth	♂	6	21–25	22.5 mm.
	♀	6	18–20	19.0 mm.
	Juv.	1		8.5 mm.
Scales from Anus to Chin	♂	6	70–78	73.1
	♀	6	69–75	71.5
Canthals	♂	6	9–12	10.5
	♀	6	10–12	10.7

"The coloration is dorsally bluish black, the enlarged scales ultramarine blue, the head is blue or emerald green, and the green may extend on the mid-dorsal line to the pelvic region. The enlarged scales may be lighter behind, or even yellow, like the base of the tail; under parts blue anteriorly, greenish posteriorly; the posterior two-thirds of the tail are blue like the back, the tip gray. Toes, and often elbows and knees, yellowish gray. The female differs from the above in having the top of the head dark gray, green between the eyes, and blue in front of the tympanum; back dark brown, nearly black, with some yellow markings on shoulders and along back to base of hind limbs. Abdomen and under side of tail yellowish. On dull rainy days and at night these colors are less conspicuous, being nearly uniformly dark.

"The species was abundant at Avakubi, where specimens were seen basking on logs and tree stumps, while another comes from a maize-field. It is also found under the thatch in the native huts and in the houses at the station" [H. L.].

VARANIDÆ

Varanus Merrem

Varanus exanthematicus exanthematicus (Bosc)

Plate XIX; Plate XX, Figure 1; Text Figure 8; Map 12

Lacerta exanthematica Bosc, 1792, Actes Soc. Hist. Nat. Paris, p. 25, Pl. v, fig. 3 (not seen). LATREILLE, 1800, Hist. Nat. Rept., I, p. 251.

Tupinambis exanthematicus DAUDIN, 1803, Hist. Nat. Rept., III, p. 80.

Varanus exanthematicus MERREM, 1820, Tent. Syst. Amphib., p. 60. BOULENGER, 1885, Cat. Lizards, II, p. 308. TORNIER, 1901, Beiheft, Arch. Naturg., LXVII, p. 72. BOULENGER, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 200. MÜLLER, 1910, Abh. Bayer. Akad. Wiss., 2 Kl., XXIV, p. 559. KLAPTOCZ, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 281.

Varanus ocellatus (*non* Rüppell) DUMÉRIL AND BIBRON, 1836, Erpétol. Gén., III, p. 496.

Monitor exanthematicus Var. *A*. SCHLEGEL, 1844, Abbild. Amph., p. 70 (not seen). PETERS, 1870, Monatsber. Akad. Wiss. Berlin, p. 109.

Regenia ocellatus GRAY, 1845, Cat. Lizards, p. 9.

A skin and skeleton (A. M. N. H. No. 10494, May 1912) from Garamba are referable to this species.

The occurrence of this species at Garamba is not surprising in view of the analogous distribution of many Sudanese species (cf. especially *Lygodactylus picturatus gutturalis*); and the record from Lake Chad serves to link it with the West African and Togo records.

The distribution of *Varanus* in Africa exhibits many of the characteristic features of the zoogeography of the Ethiopian Region, and the accompanying map has therefore been made to include the ranges of *V. ocellatus*

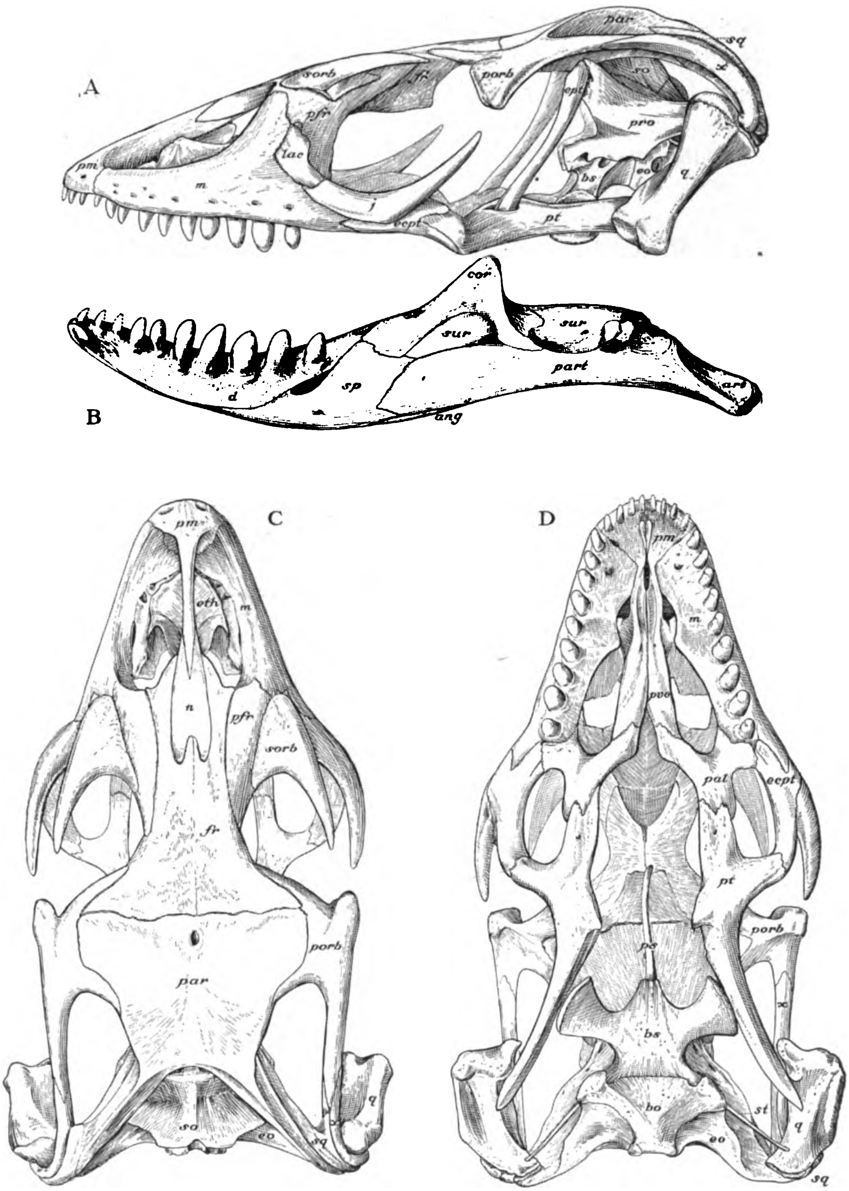
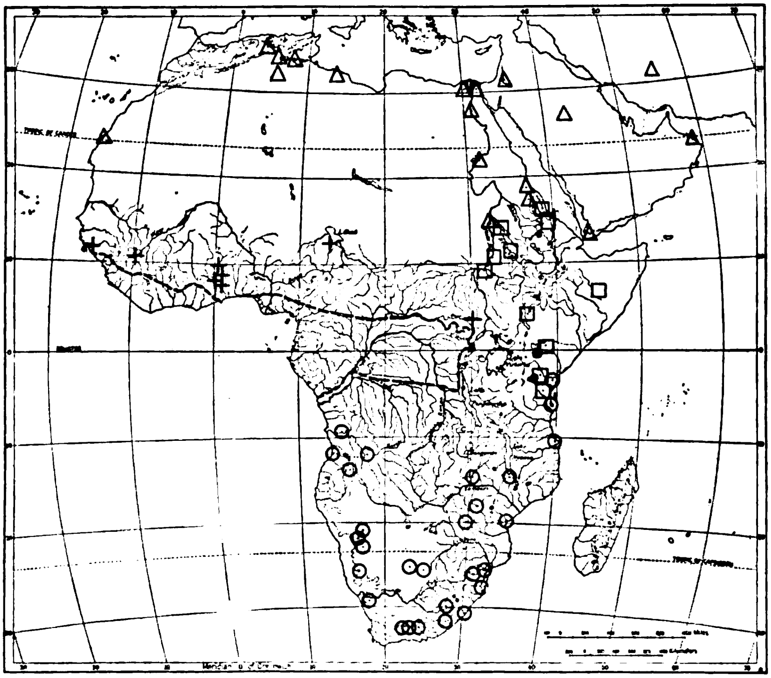


Fig. 8. Skull of *Varanus exanthematicus exanthematicus* (10494, × 1.46) A, lateral view; B, mandible from inside; C, dorsal view; D, palatal view. Ang, angular; Art, articular; Bo, basioccipital; Bs, basisphenoid; Cor, coronoid; D, dentary; Ecpt, ectopterygoid; Eo, exoccipital; Ept, epipterygoid; Eth, ethmoid; Fr, frontal; J, jugal; Lac, lacrimal; M, maxillary; N, nasal; Pal, palatine; Par, parietal; Part, prearticular; Pfr, prefrontal; Pm, premaxillary; Pro, prootic; Ps, parasphenoid; Pt, pterygoid; Pt fr, postfrontal; Porb, postorbital; Pvo, prevomer; Q, quadrate; Sur, surangular; So, supraoccipital; Sorb, supraorbital; Sp, splenial; Sq, squamosal; St, stapes; X, homology disputed.

and *V. albigularis*, as well as *V. griseus*, with that of the present species. *V. niloticus* has been omitted, as its distribution may be simply enough defined as "Africa except Barbary," occurring throughout the ranges of the other species, excepting *griseus* (see below).

The distribution center of *Varanus griseus* is Mesopotamia, from which region it reaches the deserts of northwest India eastward, Central Asia to the northeast, Arabia to the south, and Barbary to the west. In Lower Egypt its distribution is overlapped by that of *niloticus*, and to the south it reaches the northern border of the range of *V. ocellatus*.



Map 12. Distribution of *Varanus* in Africa.

△ *Varanus griseus*. A Mesopotamian species invading Africa north of the Sahara and ranging south along the Nile.

+ *Varanus exanthematicus exanthematicus*. Characteristic of the Sudanese Subprovince.

□ *Varanus exanthematicus ocellatus*. Characteristic of the Abyssinian Subprovince.

○ *Varanus exanthematicus albigularis*. Characteristic of the Eastern and Southern Subprovince.

The remaining three species inhabit the open country of Africa south of the Sahara, surrounding the Rain Forest. *V. exanthematicus* is Sudanese, extending from the headwaters of the Uele to Senegal. *V. ocellatus* is essentially Abyssinian, reaching the White Nile to the west and intergrading with *V. albigularis* to the south in British East Africa and German East Africa. *V. albigularis* inhabits the Eastern and Southern Subprovince (cf. botanical map, p. 399). Boettger's record of *albigularis* from Ogaden (1893, p. 115) has been referred to *ocellatus* by Anderson (1898, p. 1380.) The record of *albigularis* from Somaliland by Meek (1903, Publ. Field Mus. Zool., I, p. 181) should doubtless be transferred to *ocellatus* and, similarly, Sternfeld's record of *ocellatus* from Mozambique (1911, Mitt. Zool. Mus. Berlin, V, p. 416) should logically belong to *albigularis*, the specimen recorded being, in fact, intermediate between the two forms.

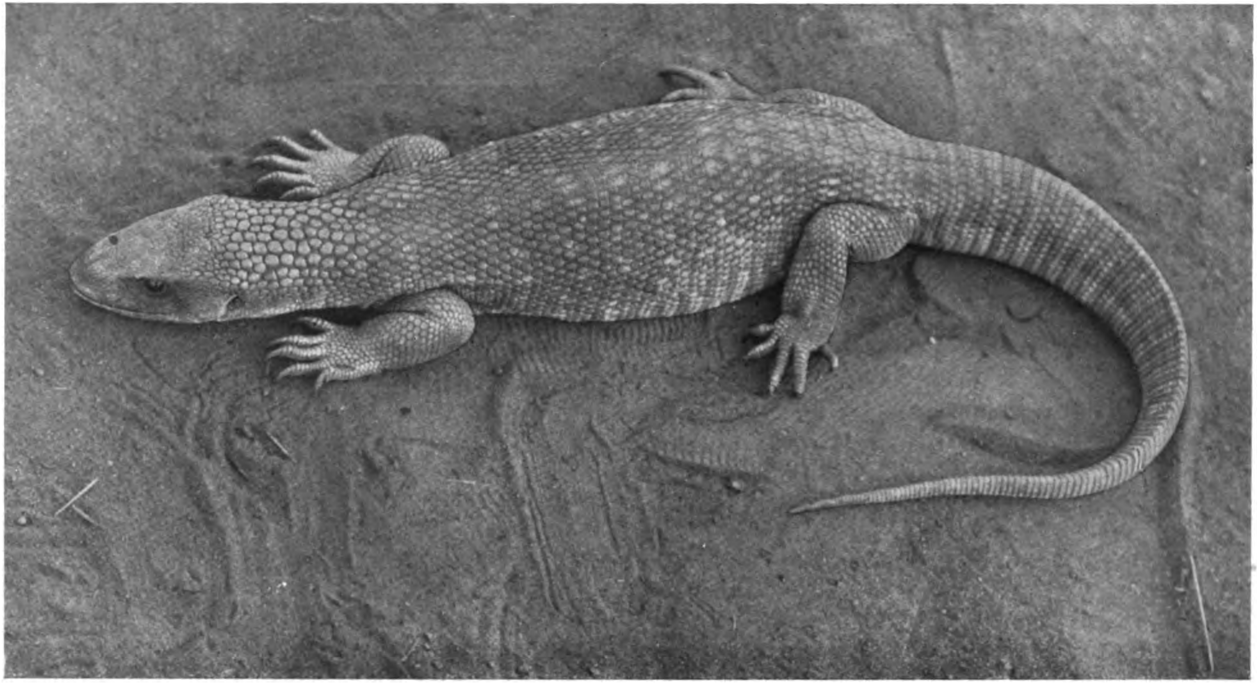
The intergradation of *albigularis* and *ocellatus* has been discussed by Tornier (1897, p. 38), and Werner (1907, p. 1843) suggests the probability of similar intergradation between *ocellatus* and *exanthematicus*. These geographical and morphological relationships seem to the writer to be logically and usefully expressed by classification of the three forms as subspecies, *Varanus exanthematicus exanthematicus* (Bosc), *V. exanthematicus albigularis* (Daudin), and *V. exanthematicus ocellatus* Rüppell.

The specimen was a male about 650 mm. in length. The position of the nostrils and the large nuchal scales readily place it as *exanthematicus exanthematicus*.

"Forty miles north of Garamba, in the midst of grass-covered plains, the barren space of a leveled termite hill with a smooth, glossy opening attracted my attention. The natives who accompanied me were sure it was the home of a python, especially as the entrance looked like one of the numerous holes this snake chooses as a retreat. Only one man was willing to brave the danger of breaking the edge of the cavity and ramming the shaft of his lance into the hole. When it had penetrated nearly two feet, the wooden end was grasped and to our surprise this monitor, after great resistance, was hoisted to the daylight. Far from loosing the hold with its teeth, it held on for several minutes, lashing its tail against the ground. Suddenly, however, it let itself drop, landing in a squatting position, and to our amazement raised its body high from the ground and made a rush for safety. This manner of running, in which elbows and knee-joints of the straightened fore and hind limbs were drawn beneath the body, appeared unusual, for when slowly progressing the limbs are extended laterally; the tail was carried in a graceful downward curve. No hiding place was in sight, however, and when overtaken it turned and fearlessly attacked, but, far from trying to bite and snap, as the Nile monitor does when cornered, its defense for a time consisted of fairly rapid and well-directed blows with the tail. It soon settled down in its habitual pose (Pl. XIX) and was content to hiss, a noise caused chiefly by the outrushing air with which it swelled the body more than one-third of the ordinary size. When held by

PLATE XIX

Varanus exanthematicus exanthematicus (Bosc). A. M. N. H. No. 10494; length 650 mm.



the nape of the neck it tried to break free by wrenching body and tail; the forelimbs, however, were firmly pressed against its breast. I was not surprised at the fear of the natives, some of whom considered its bite poisonous, for, although it often allowed itself to be handled, it might snap at anything, not sparing its own limbs and tail when they were held before its mouth. Once the jaws were locked they might not be opened again for half an hour, and from the way the creature held on it seemed clear that only by breaking its jaws would the victim be released. Our captive feigned death in many positions (Pl. XX, Figure 1), sometimes at slight provocation, with eyes wide open, giving no sign of life even when turned on belly or back.

"Some natives who knew the Nile monitor and *Gerrhosaurus zechi* Tornier came from villages nearby to see our rare animal, and although I offered a high reward for other specimens none was reported to us. In captivity all food was refused. The stomach was empty and no excrement giving indication of the habitual food was found in its shelter, which, however, clearly had been occupied for several months, and it may be possible that during the dry season this species estivates.

"Judging from our only specimen, an adult male measuring barely two feet two inches in length, the Sudan monitor (*V. e. exanthematicus*) is considerably smaller than the Nile monitor (*V. niloticus*) with its record of about five feet eight inches. The ventral surface is comparatively light in color and the scales somewhat glossy; the dusty gray of the upper side matches the color of the burrow and is in striking contrast with the conspicuous shiny black and yellow pattern of the Nile monitor. Light dots, arranged in transverse rows, were visible after the skin had been washed, a pattern probably more distinct in younger specimens" [H. L.].

The sluggishness and fearlessness of this species in contrast with the agility and wariness of *niloticus* have been noted by Klaptocz (1913, p. 281); and *ocellatus* from Khor Attar is similarly characterized by Werner in this regard.

Varanus niloticus (Linnæus)

Text Figures 9 and 10

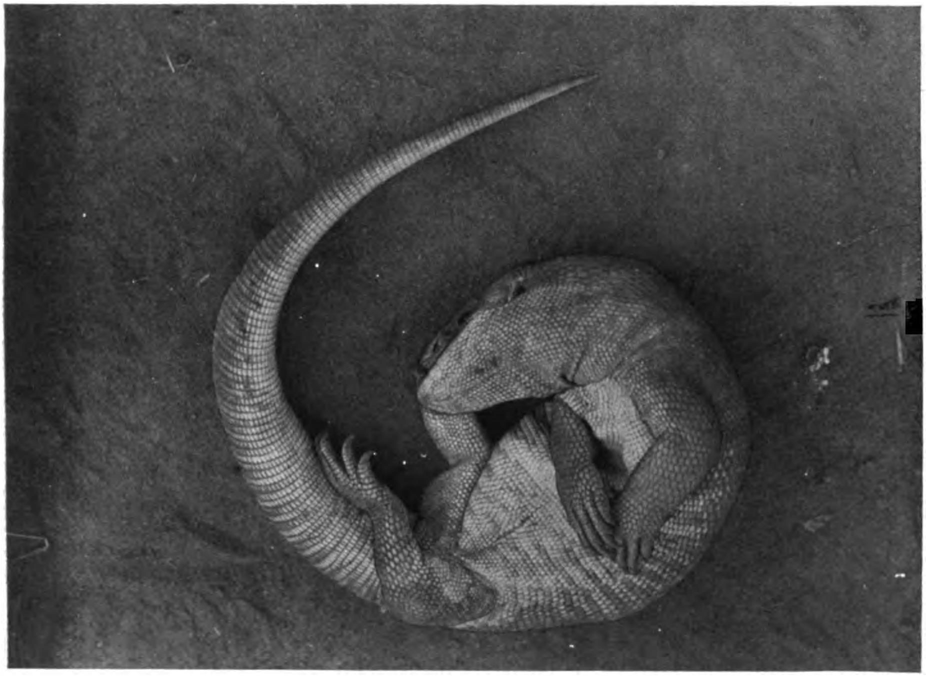
Lacerta nilotica Linnæus, 1766, Syst. Nat., Ed. 12, p. 369.

Varanus niloticus Boulenger, 1885, Cat. Lizards, II, p. 318. Dollo, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 153. Boettger, 1886–1887, Ber. Senck. Ges., p. 55; 1887–1888, p. 23. Günther, 1888, Proc. Zool. Soc. London, p. 50. Mocquard, 1888, Mém. Cent. Soc. Philom. Paris, p. 115. Boulenger, 1892, in Distant, Naturalist in the Transvaal, p. 174. Matschie, 1892, Zool. Jahrb. (Syst.), V, p. 612. Pfef-

PLATE XX

Figure 1. *Varanus exanthematicus exanthematicus* (Bosc). A. M. N. H. No. 10494. Characteristic attitude when annoyed.

Figure 2. *Gerrhosaurus zechi* Tornier. A. M. N. H. No. 10722; ♀; length 302 mm.



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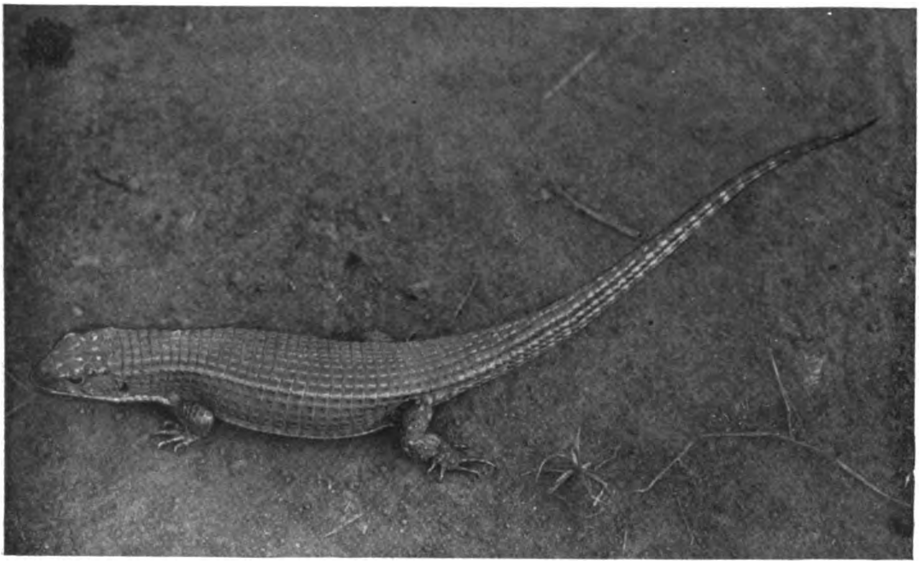

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FER, 1892, Jahrb. Hamburg. Wiss. Anst., X, p. 72. GÜNTHER, 1894, Proc. Zool. Soc. London, p. 87. BOCAGE, 1895, Herpétol. Angola, p. 26. BOULENGER, 1896, Ann. Mus. Stor. Nat. Genova, (2) XVII, p. 17. GÜNTHER, 1896, Ann. Mag. Nat. Hist., (6) XVII, p. 264. WERNER, 1896, Jahrb. Ver. Magdeburg, p. 141. BOULENGER, 1897, Proc. Zool. Soc. London, p. 800; 1897, Ann. Mus. Stor. Nat. Genova, (2) XVII, p. 278; 1897, (6) XIX, p. 277. JOHNSTON, 1897, British Central Africa, p. 361. MOCQUARD, 1897, Bull. Soc. Philom. Paris, (8) IX, p. 6. SJÖSTEDT, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 12. TORNIER, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 38. ANDERSON, 1898, Zool. Egypt, I, p. 140, Pl. XVIII. WERNER, 1899, Verh. Zool.-Bot. Ges. Wien., XLIX, p. 133. BOULENGER, 1900, Proc. Zool. Soc. London, p. 451. FLOWER, 1900, Proc. Zool. Soc. London, p. 967. TORNIER, 1900, Zool. Jahrb. (Syst.), XIII, p. 590. LAMPE, 1901, Jahrb. Nassau. Ver. Naturk., LIV, p. 210. TORNIER, 1901, Zool. Anz., XXIV, p. 61; 1901, Beiheft, Arch. Naturg., LXVII, p. 73. BOULENGER, 1902, in Johnston, Uganda Protectorate, p. 445. TORNIER, 1902, Zool. Jahrb. (Syst.), XV, pp. 582, 674. WERNER, 1902, Verh. Zool.-Bot. Ges. Wien, LII, p. 342. LÖNNBERG, 1903, Ark. Zool., Stockholm, I, p. 65. BOULENGER, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 200. TORNIER, 1905, Zool. Jahrb. (Syst.), XXII, p. 375. JOHNSTON, 1906, Liberia, II, p. 833. BOULENGER, 1907, Ann. Mag. Nat. Hist., (7) XVI, p. 111; 1907, Proc. Zool. Soc. London, p. 485. ROUX, 1907, Zool. Jahrb. (Syst.), XXV, p. 424. WERNER, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI, Abt. 1, p. 1843. CHUBB, 1908, Ann. Mag. Nat. Hist., (8) II, p. 221. ODHNER, 1908, Ark. Zool., Stockholm, IV, No. 18, p. 3. CHUBB, 1909, Proc. Zool. Soc. London, p. 593. BOULENGER, 1910, Ann. Mus. Stor. Nat. Genova, (3) IV, p. 310; 1910, Ann. S. African Mus., V, p. 471. LÖNNBERG, 1910, in Sjöstedt, Kilimandjaro-Meru Expedition, I, part 4, p. 5. MEEK, 1910, Field Mus. Publ. Zool., VII, p. 409. ROOSEVELT, 1910, African Game Trails, p. 432, figs. WERNER, 1910, Denkschr. Med. Naturw. Ges. Jena, XVI, p. 327. LÖNNBERG, 1911, Svenska Vetensk. Akad. Handl., XLVII, No. 6, p. 13. STERNFELD, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 209. NIEDEN, 1913, Mitt. Zool. Mus. Berlin, VII, p. 74. WERNER, 1913, in Brehm's Tierleben, Ed. 4, II, pp. 125, 129.

(For bibliography of this species *ante* Boulenger, 1885, refer to Anderson, 1898, p. 140.)

There are thirty-one specimens of *Varanus niloticus*, 9 young alcoholic, the remainder represented by dried skins and skeletal material: A. M. N. H. Nos. 10521–22 (September–October 1913) are from Akenge; 10497 (October 1909), 10498 (December 1913), Avakubi; 10086, Belgian Congo; 10512–17 (February–March 1911), 10518–19 (January 1913), Faradje; 10500 (February 1910), Gamangui; 10501 (March 1910), 10502–09 (April–May 1910), 10510 (June 1914), Medje; 10511 (December 1910), Niangara; 10523–24 (November–December 1913), Niapu; 10499 (December 1909), Ngayu; 10520 (August 1913), Poko; 10495–96 (August 1909), Stanleyville.

This species is distributed over almost the whole of Africa, inhabiting the forest and open country alike. The riparian habitat doubtless contributes to this wide distribution, and the Nile has evidently served as the highway for the northern extension of its range to Lower Egypt.

Several young alcoholic specimens have a pair of apparently perforated preanal scales, more or less distinct, as observed by Anderson (1898, p. 140). The coloration in this species has been well described and figured by the same author (*loc. cit.*, Pl. XVIII). From the field notes of the expedition the following observations may be summarized.

The hyoid apparatus in a large specimen from Medje (Field No. 479) extends backward on the side of the neck, with two lateral external folds which posteriorly form tapering protuberances, 26 mm. in length, in front of the fore limbs, containing the ends of the hyoids.

The species is fairly common in and about the swampy and reedy portions of the rivers and brooks. They often bask in cleared places in the afternoon, but keep near sheltering bushes or reeds. A specimen was taken from an island in the Ituri opposite Avakubi. The natives have the same fear of the *Varanus* as of a crocodile. The Mangbetu eat the flesh, which is said to taste like chicken (cf. Steindachner, 1870, Sitzber. Akad. Wiss. Wien, math.-natur., LXII, Abt., p. 330). When pursued, the animal runs a distance, pauses, and then runs again. When cornered it attacks fiercely, biting, and slashing with its tail, with which it deals powerful and well directed blows. The tails of the larger specimens are often mutilated in consequence.

The correlation of the very curious dentition in this species, in which the posterior teeth are developed into broad round crushers, with molluscivorous diet is confirmed and extended to include crustaceans, for which the crushing dentition is equally adapted, by the observations of Messrs. Lang and Chapin, who record stomach contents of adult specimens as follows:

No. 10499.— Small land snails in gullet.
No. 10502.— Four large land snails (*Achatina*) partly crushed.
No. 10506.— Three crabs (of two species), and one large land snail, the carapaces and shell crushed.
No. 10507.— One small crab and the remains of a small fish.
No. 10524.— Two large snails, without the shells; remains of several crabs, without carapaces, though the feet are present; a small water-snake.

Werner (1907, p. 1843) records stomach contents of fresh-water crabs and small mussels. Rats and mice are readily taken in captivity according to Anderson (1898, p. 142). The accounts of the robbing of crocodile nests by this species by Roosevelt (1910, p. 432, figs.) are of especial interest in view of its reputation as an enemy of that species (see Werner, 1913, V, pp. 125 and 128). There are frequent accounts of the voracity and destructiveness of the species and Johnston (1906, p. 816) speaks of the depredations on poultry. In spite of the great range of diet, there can be little doubt that the strongly modified dentition of the *niloticus* of the Congo Forest is correlated with the diet of crabs and molluscs.

The contents of three stomachs of the juvenile specimens (other stomachs were empty) were: No. 10509, remains of a large mantid, remains of a grasshopper, a mass of leaves, four large slugs, and a small frog; No. 10520, remains of a cricket; No. 10523, miscellaneous insect remains.

The changes in the dentition of *V. niloticus* with age are well shown in the extensive series of skulls collected by the present expedition. (Refer to Boulenger, 1885, II, p. 318, and Lönnberg, 1903, p. 65.) The extremes in form of teeth are figured herewith (Figs. 9 and 10). Figures (Fig. 8) of the skull of *V. exanthematicus* are presented for comparison with the radically different *niloticus*, though it is beyond the scope of the present paper to enter upon a discussion of the distinctions. It may be mentioned that in the most striking of these, the narrowness of the parietal in *niloticus*, skulls of juvenile specimens in the same species exhibit a condition almost exactly intermediate between that in the two skulls figured.

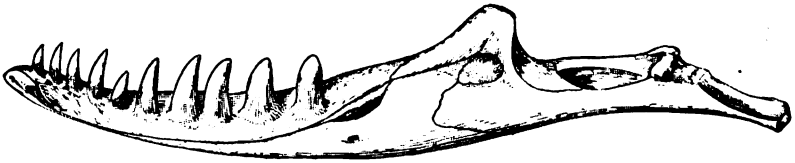

Fig. 9. Mandible of *Varanus niloticus*, juvenile (10086, × 3). Internal view. Compare the form of the teeth with that of an adult (Fig. 10, B).

The powerful ridges of the parietal in *niloticus* may serve to increase the strength of the attachments of the muscles operating the lower jaw, in secondary correlation with the development of the crushing dentition.

Summary of Measurements and Scale Characters

	Age	No. of Specimens	Extremes	Average
Length	Adult	18	810–1718	1337.7 mm.
	Juv.	9	300–625	387.4 mm.
Body	Adult	18	320–640	510.7 mm.
	Juv.	9	110–240	145.4 mm.

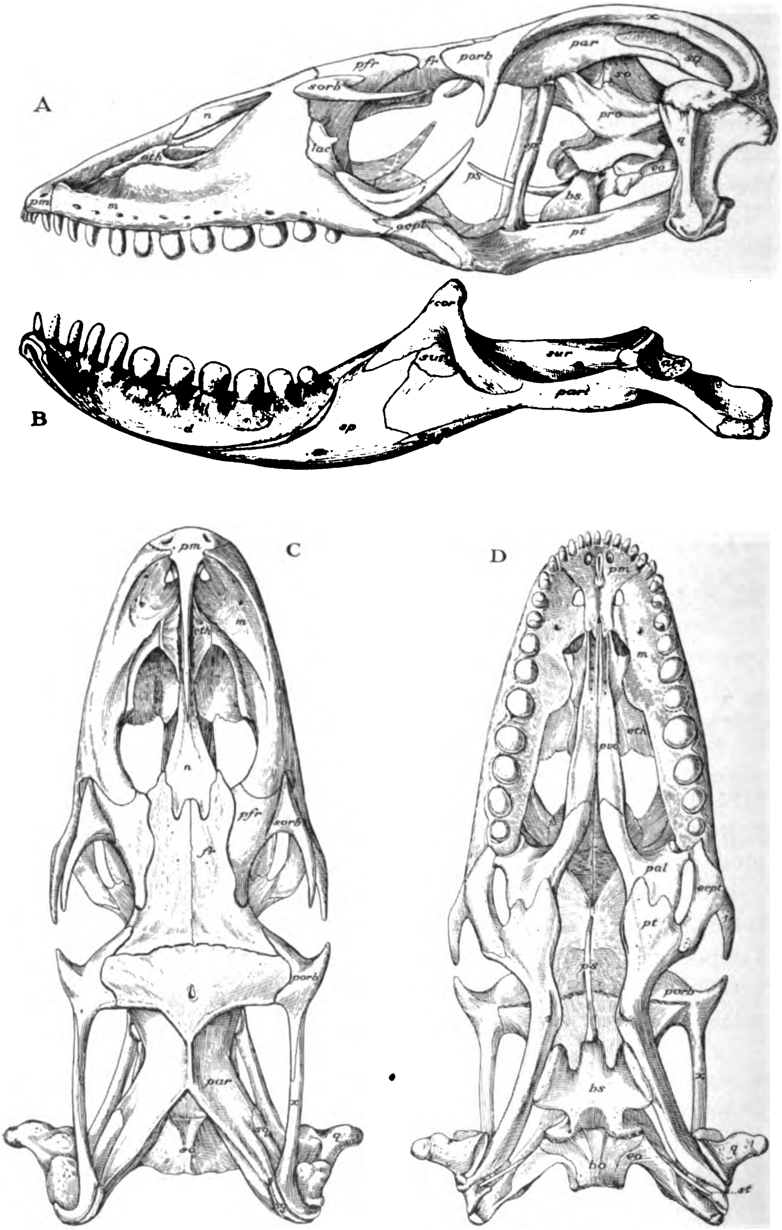

Fig. 10. Skull of *Varanus niloticus* (10500, × .72), lettering as in Fig. 8.

	Age	No. of Specimens	Extremes	Average
Tail	Adult	18	490–1100	827.0 mm.
	Juv.	9	190–385	244.2 mm.
Tail/Length	Adult	18	.58–.65	.62
	Juv.	9	.61–.63	.62
Axilla to Groin	Juv.	9	54–130	75.7 mm.
Arm	Juv.	9	36–77	47.5 mm.
Leg	Juv.	9	48–100	61.9 mm.
Ventrals, Transversely	Juv.	9	80–90	83.5

LACERTIDÆ

Artificial Key to the Genera of Lacertidæ Known to Inhabit the Congo Rain Forest

A. Interparietals and frontoparietal fused; two central rows of dorsal scales large, smooth, laterals small; tail laterally denticulate. *Holaspis.*

AA. Head shields normal. Dorsal scales not as above, tail not laterally denticulate.
  B. Dorsal scales juxtaposed, small.
    C. Nostril separated from 1st labial by lower nasal; digits keeled inferiorly. (Occurrence doubtful in forest). *Eremias.*
    CC. Nostril bordered by 1st labial, digits not keeled.... *Lacerta.*
  BB. Dorsal scales large, imbricate, keeled.
    C. Ventrals not keeled (Nostril distinctly separated from 1st labial in the Ituri species)................... *Algiroides.*
    CC. Ventrals keeled.
      D. Dorsal scales large, keeled, in longitudinal rows, laterals small.................................. *Poromera.*
      DD. Dorsals and laterals similar............. *Bedriagaia.*

Lacerta Linnæus

Key to the African Species of *Lacerta*

A. Tail near base strongly spinose (Section *Centromastix* Boulenger).
  B. Head shields normal, dorsal scales 33–36.............. *echinata.*
  BB. No interparietal, dorsal scales 43–46.................. *langi.*

AA. No spinose scales on tail (Section *Zootoca* Wagler).
  B. Occipital short, femoral pores 9–10.................. *vaueresell*i.
  BB. Occipital longer than broad, fem. pores 16–18......... *jacksoni.*

Section *Centromastix* Boulenger

Lacerta langi, new species[1]

Plate XXI; Text Figure 11

Two specimens (A. M. N. H. Nos. 10525–26, April 1914) from Medje belong to an undescribed lacertid species.

In distribution, the new form is widely separated from its West African ally, *L. echinata* Cope, but, with the uniform habitat of the Rain Forest, exploration of the intervening area may discover an overlapping of the ranges or even an intergradation between the two forms.

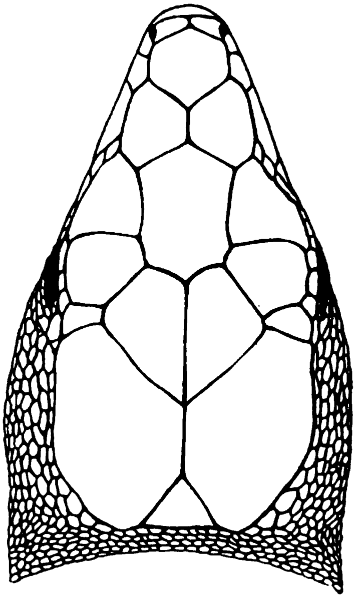

Fig. 11. Head of *Lacerta langi*, (type, 10525, × 4).

Diagnostic Characters

Allied in habitus and in the spinous base of the tail to *L. echinata* Cope (Section *Centromastix* Boulenger), from which it is readily distinguished by (1) the absence of an interparietal; (2) higher number of dorsal scales, 43–46 instead of 33–36; (3) fewer scales between collar and gulars, 27–28 instead of 35–43; (4) femoral pores, 9 or 10 instead of 12–13.

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[1] *Lacerta langi.* Named in honor of Mr. Herbert Lang, leader of The American Museum of Natural History Congo Expedition.

Detailed description

Type: A. M. N. H., No. 10525.

Slender; head moderate; tail more than twice the length of the body; limbs moderately developed, adpressed hind limb not reaching elbow; toes long.

Scutellation of the head normal lacertoid except for the entire absence of an interparietal. Rostral moderate, supranasals meeting behind it; frontonasal six-sided, as long as or slightly longer than broad; prefrontals forming a median suture; supraoculars four, the anterior very small, with three small elongate granules between them and the eight supraciliaries (six supraciliaries in the paratype); frontal as long as its distance from the rostral, equalling or exceeding the length of the interparietals; these large, four-sided, the posterior side slightly convex; parietals large, outer edge rounded, forming a median suture between the interparietals and the occipital; occipital as broad as long, subtriangular; temporals small, faintly keeled. Nostril narrowly entered by rostral, broadly by the first labial, bounded above and behind by a supra- and postnasal. Labials 8–9 above, 7–7 below; five pairs of chin shields, the first three in contact, two loreals. Lower eyelid scaly.

The dorsal scales small, juxtaposed, slightly keeled, in forty-six longitudinal series in the type, forty-three in the paratype, in 118 and 115 transverse rows from occiput to anus. Ventrals six in a cross row, median pair narrowest, thirty-two from anals to collar. Eight scales in the collar, which is serrate (nine in the paratype). A large anal plate bordered by six smaller ones. The caudals in distinct verticils, all strongly keeled, those above and on the sides produced into long spines from the tenth to twenty-fifth verticil. Perforate femoral scales 9–9 in the type, 9–10 in the paratype. Without further material it seems best to disregard the very slight development of femoral pores, which may be explainable as an individual character, possibly juvenile, possibly modified by the sex, both specimens being females.

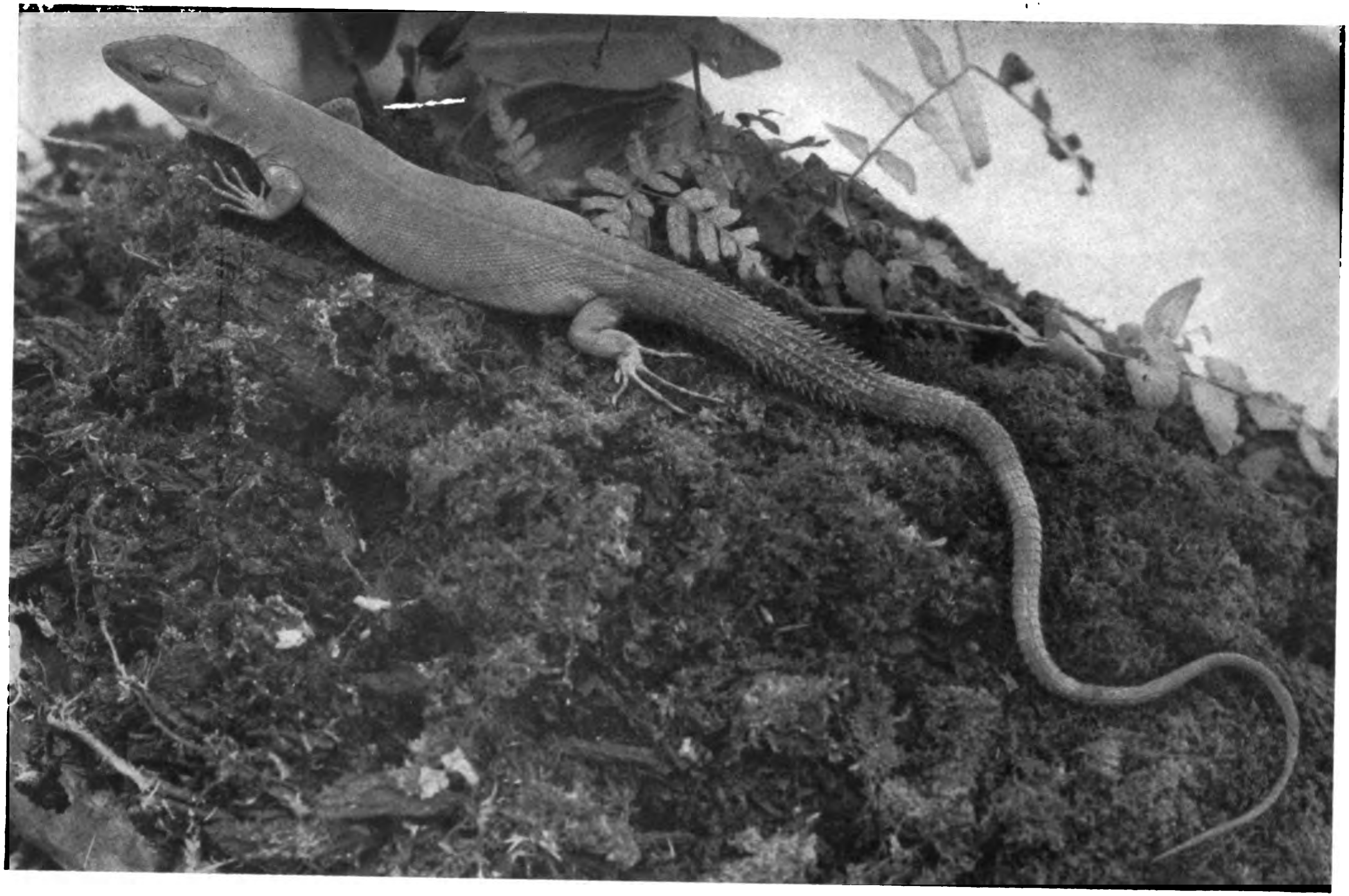
The coloration in alcohol (from formalin) is a uniform greenish gray. In life, the field notes describe it as bright green above, lighter beneath and darker on the crown, the large gulars grayish green. A few of the outer throat scales are orange, as well as the outer row of ventral plates, the interior rows being only slightly tinged with orange. In the paratype, mutilated by an arrow-shot, the orange color is visible on the last pair of chin shields, on the outer collar scales, and on the large scales between the arms, not on the outer row of ventrals as in the type.

Measurements

A. M. N. H .No.	10525 (type)	10526
Length	275	272 mm.
Body	90	84 mm.
Tail	185 (regenerated?)	188 mm.
Tail/Length	.67	.69
Axilla to Groin	54	50 mm.
Snout to Arm	31	30 mm.
Arm	27	26 mm.
Leg	35	35 mm.
Head Length	20	18.2 mm.
Head Breadth	12	11 mm.

PLATE XXI

Lacerta langi, new species. A. M. N. H. No. 10525, type; ♀; length 275 mm.



The species has the same habitat as *Bedriagaia,* specimens of which were taken "on a tree trunk near the water."

"When felling trees to bridge a forest brook, in 1910, the Medje caught two rare forms of large green lizards, *Lacerta langi* and *Bedriagaia tropidopholis.* The specimens were later spoiled, however, through the breaking of the jar, and though, on my return in 1914, I offered a high reward for the capture of others to replace them, it was not until several months had passed that any were secured. Of the two species, *Lacerta langi* is smaller, more lively, and of a brighter green. A large male measured more than a foot in length, and the peculiar spines on the basal portion of its tail were more pronounced and characteristic than those on the females collected. The presence of these typically arboreal lizards in a rather moist, swampy portion of the forest, where the trees are covered with long green moss, is noteworthy. They retreat into hollow trees, from which they emerge only late in the afternoon, and, due to the ease with which they can conceal themselves and their swiftness, are difficult to capture. Various hardshelled beetles found on tree trunks are eaten, and bugs, caterpillars, and termites complete the diet" [H. L.].

Section *Zootoca* Wagler

Lacerta vaueresolli Tornier

Text Figure 12

Lacerta vaueresolli TORNIER, 1902, Zool. Anz., XXIV, p. 701. BOULENGER, 1909, Trans. Zool. Soc. London, XIX, p. 242. DEGEN, 1911, Proc. Zool. Soc. London, p. 35. STERNFELD, 1912, Sitzber. Ges. Naturf. Freunde Berlin, p. 386; 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exped., IV. p. 317, Pl. VI, fig. 2. NIEDEN, 1913, Mitt. Zool. Mus. Berlin, VII, p. 75 BOULENGER, 1916, Trans. Zool. Soc. London, XXI, p. 3.

A juvenile specimen (A. M. N. H. No. 10527) from Walikale, January 1915, presented to the collection by Dr. J. Bequaert, has been identified with this species.

The known range of this species is restricted to the eastern part of the Congo Forest and the outlying forest areas of the Lake Kivu region, where the more widely distributed *L. jacksoni* occurs with it.

Boulenger (1909, p. 242) and Degen (1911, p. 35) have expressed doubts as to the status of *vaueresolli,* whose validity has, however, been sufficiently established by Sternfeld (1912, p. 317 *et seq.*). The unfortunate contradiction as to the femoral pores in the original description, as well as the erroneous tail-length, have been cleared up by Sternfeld, and the present specimen agrees in most respects with his redescriptions. The shortness of the parietal region, emphasized by Tornier, is striking, and the writer ventures to supplement Sternfeld's figure (*loc. cit.*, Pl. vi, fig. 2) by a more detailed representation of the head of the present specimen (Fig. 12).

The extreme shortness of the occipital and the presence of two anterior loreals do not appear to be described by Tornier and Sternfeld, and may be individual characters but, if at all constant, would add materially to the distinction from *L. jacksoni.*

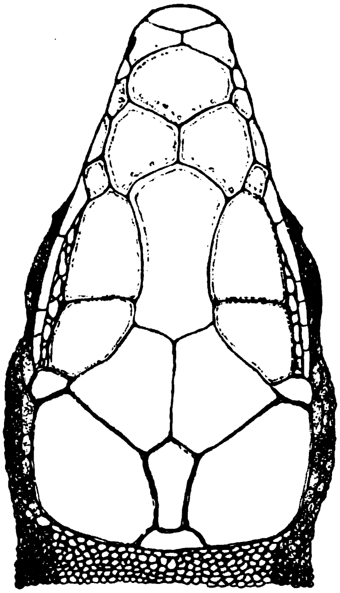


Fig. 12. Head of *Lacerta vauereselli* (10527, × 8).

Rostral not entering nostril, which is bordered by the first labial below. An anterior supraloreal. Occipital, wider than the interparietal, short. Head plates otherwise normal, the parietals slightly shorter than the frontal, frontal slightly longer than the distance between it and tip of snout.

Coloration as described by Sternfeld, very vivid in the present specimen. No mid-dorsal series of spots. The lateral black band beginning at the nostril is sharply defined above on the canthus and does not include the upper anterior loreal. The top of the head is copper color, the dorsal band (ten scales wide on the mid-body) is bronze-green, becoming brown at the base of the tail. The lateral white line, beginning on the shoulder, passes *through* the ear and outlines its lower border. Sternfeld's statement that it passes "over" the ear may possibly be taken in the same sense; the position of such a band would scarcely be expected to vary. It is continued from the axilla nearly to the groin as a double row of rather irregular white spots. Ventrals green, each shield with more or less black at its anterior edge. Labials, gulars, and throat white, spotted with black.

Measurements and scale characters of A. M. N. H. No. 10527 (♀): Length, 107 mm.; body, 34 mm.; tail, 73 mm.; tail/length, .68; axilla to groin, 17 mm.; arm to snout, 14 mm.; arm, 14 mm.; leg, 21 mm.; head length, 9 mm.; head breadth, 6.2 mm.; ventrals, transverse rows, 20; ventrals, longitudinal rows, 6; dorsals, transverse (occiput to anus), 86; dorsals, longitudinal rows, 46; collar scutes, 10; collar to chin shields, 27; labials anterior to subocular, 4–4; femoral pores, 9–10.

Bedriagaia Boulenger

Bedriagaia tropidopholis Boulenger

Plate XXII; Text Figures 13 and 14

Bedriagaia tropidopholis BOULENGER, 1916, Ann. Mag. Nat. Hist., (8) XVIII, p. 112.

Three specimens (A. M. N. H. Nos. 10528–29, April 1914, and 10530, July 1914) of this recently described genus were obtained at the type locality, Medje.

This form is known only from the Ituri region.

The specimens agree closely with Boulenger's detailed description, and show only minor variations among themselves. The rostral and frontonasal form a suture in two of the three. The supraciliaries are 7–7 in two, and 6–7 in the third, with or without a granular scale between them and the oculars. The preanal scales in two rows in one specimen, medianly enlarged in the others, (Fig. 14) but both of the adults are males, and this character is not distinctive of the sex in this species (as in *Poromera*). The collar contains eight scales, with twenty-four to twenty-nine from the gular symphysis to the collar. Upper labials eight, lower seven or six. The number of ventrals in a longitudinal series varies from thirty-one to thirty-four; the dorsals in a transverse row twenty-three to twenty-six, in a longitudinal (to a point above the anus) seventy to seventy-nine. Femoral pores 13–13 in two males; the pore-bearing scales in the juvenile female 12–12, not all perforate.

The coloration in alcohol as described by Boulenger. In one of the present male specimens the back is spotted with bluish green spots covering two or three scales, on a black ground color; sides greenish, slightly marked with black (on single scales); tail and venter bluish green. First five cross-rows of the ventrals, and the collar, pinkish gray; throat gray, chin shields

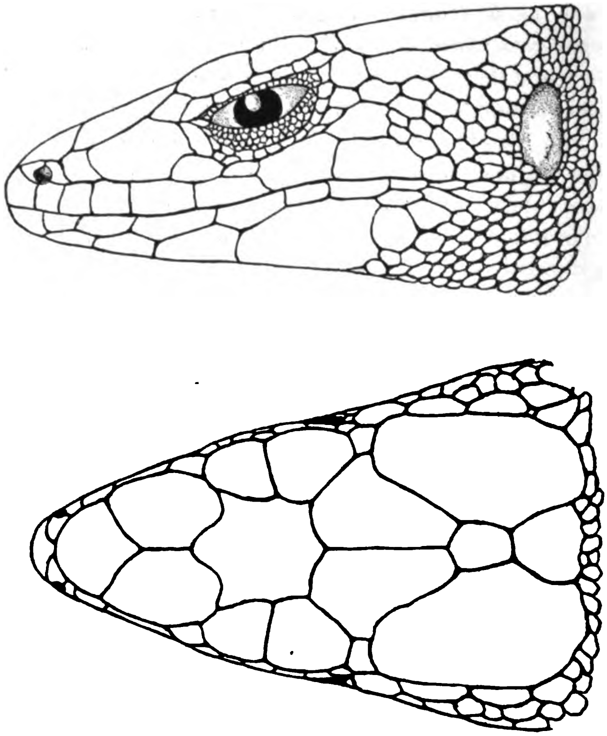


Fig. 13. Head of *Bedriagaia tropidopholis* (10530, × 3).

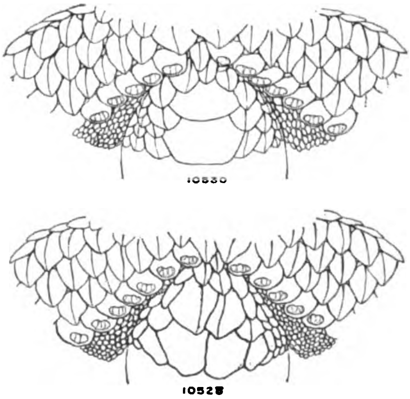


Fig. 14. Variation in anal region of *Bedriagaia tropidopholis* (10528, 10530).

marked centrally with pink. The second male displays the same coloration much less distinctly, while the single female is uniform green beneath, except for the chin shields which have an obscure light median line and are nearly uniform above. In all three the head plates are strongly mottled with black.

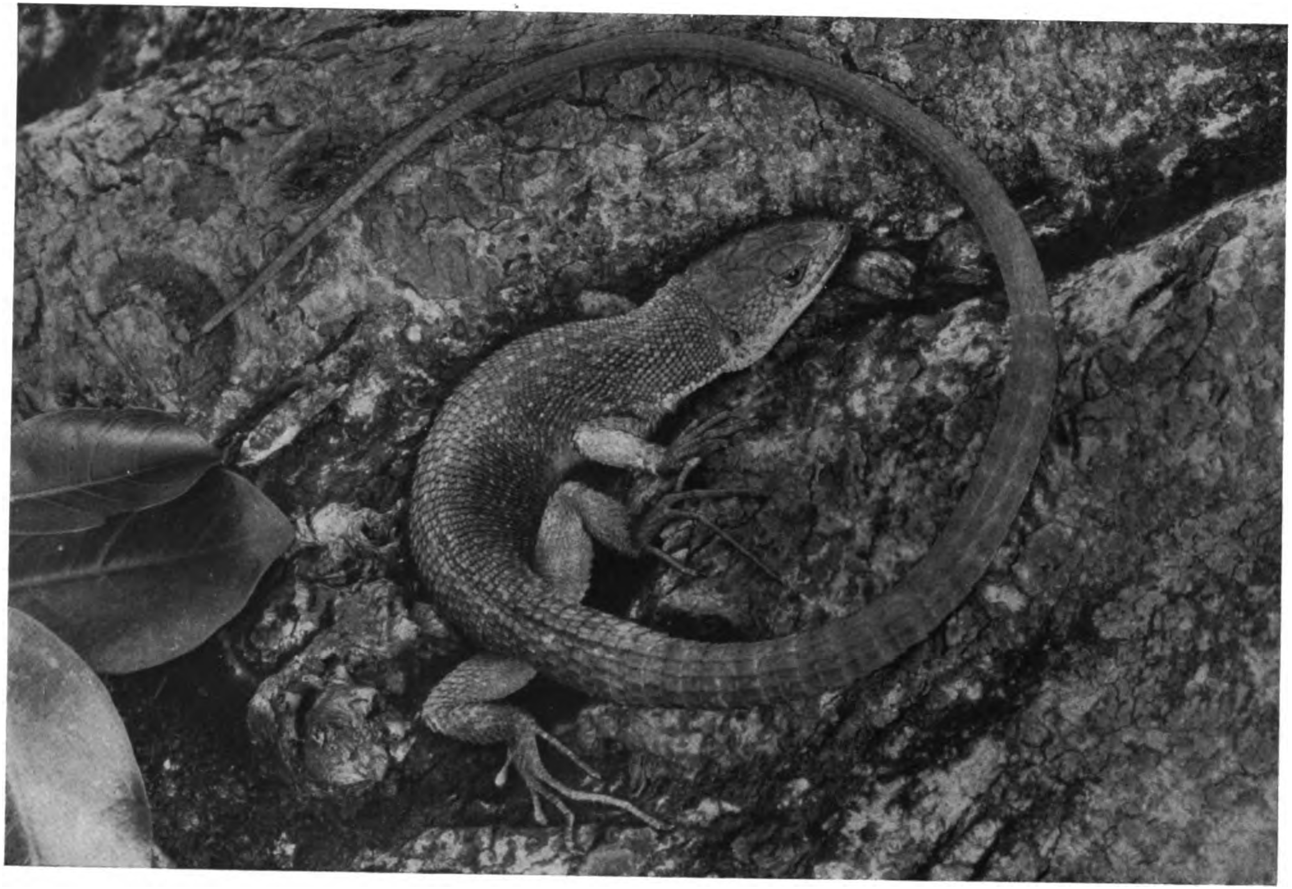
Measurements

A. M. N. H. No.	10529	10528	10530
Sex	♀ (Juv.)	♂	♂
Total Length	219	389	389 mm.
Body	83	116	115 mm.
Tail		273	274 mm.
Tail/Length		.70	.70
Axilla to Groin	49	66	65 mm.
Snout to Arm	29	41	41 mm.
Arm	30	39	37 mm.
Leg	38	57	52 mm.
Head Length	18.5	26.5	25.5 mm.
Head Breadth	11.2	16.1	16 mm.

"While the photograph (Plate XXII) hardly indicates the great length (15.75 inches) of an adult male, the characteristic attempt to find concealment, even in a slight unevenness of a tree trunk, is well shown. The scales of the upper side are rough, heavily ridged, and not glossy, thus enhancing the inconspicuousness of the green color pattern. Some specimens are marked by a series of blue-green spots, while the smooth scales on the upper part of the head are mottled with black. *Bedriagaia tropidopholis* inhabits the swampy portion of the forest, together with *Lacerta langi*, and, though clearly arboreal, frequently comes to the ground and basks upon boulders in the brooks. This species is more sluggish than the equally shy *L. langi* and when in danger has the peculiar habit of jumping from any height, and, instead of running up a tree, makes a dash for the shelter of leaves or logs. On the level it ran swiftly for a distance of ten to twenty yards, with tail in the air, but on finding no suitable retreat curled up flat on the ground. Held in the hand it bit and lashed the tail much like the Nile monitor; it apparently was not inconvenienced when thrown into the water, where it swam with ease. The food had consisted of small weevils and other beetles, although large ants and several caterpillars had also been taken" [H. L.].

PLATE XXII

Bedriagaia tropidopholis Boulenger. A. M. N. H. No. 10528; ♂; length 398 mm.



Algiroides Fitzinger

Algiroides africanus Boulenger

Plate XXIII, Figure 1; Text Figures 15 and 16; Map 13

Algiroides africanus Boulenger, 1906, Proc. Zool. Soc. London, p. 570, fig. 96.
Peracca, 1909, in Il Ruwenzori, I, p. 167.
Adolfus fridericianus Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 220, fig.

This species is represented in the collection by 143 specimens: A. M. N. H. Nos. 10531 (January 1910), 10534 (April 1914), 10535–633 (June 1914), 10634–49, 10652–73 (July 1914) are from Medje; 10532–33 (November 1910), Niangara; 10650–51 (April 1914), Penge.

Peracca's specimen from Fort Portal is the second record of *A. africanus* in Uganda. The type locality, Entebbe, on the northwest corner of Victoria Nyanza is in an "island" of Rain Forest (see Engler, Vegetation der Erde, IX, I, part 1, Pl. II). From the abundance of the species at Medje and its comparative rarity outside the forest, it may be considered as essentially a forest species and characteristic of the Ituri region, though the westward extension of its range is unknown. Local occurrence outside the Rain Forest proper is exemplified in the present collection by the two specimens from Niangara, where typical forest conditions reappear bordering the Uele River.

The writer adopts a conservative attitude toward the generic distinction of the present form from the Mediterranean *Algiroides*. In the large series now available, the nostril is widely separated from the first labial in every case and is enclosed between two instead of three nasals. It is true that this is one of the characters used in the definition of genera in the Lacertidæ (cf. Boulenger, 1887, Cat. Lizards, III, pp. 2 and 44). No natural classifi-

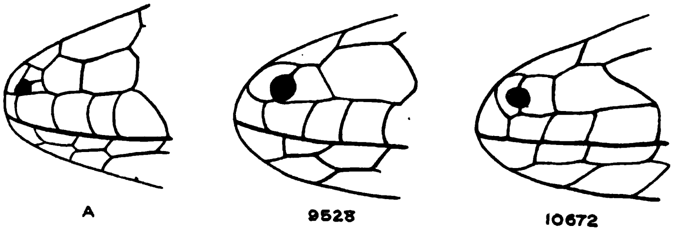
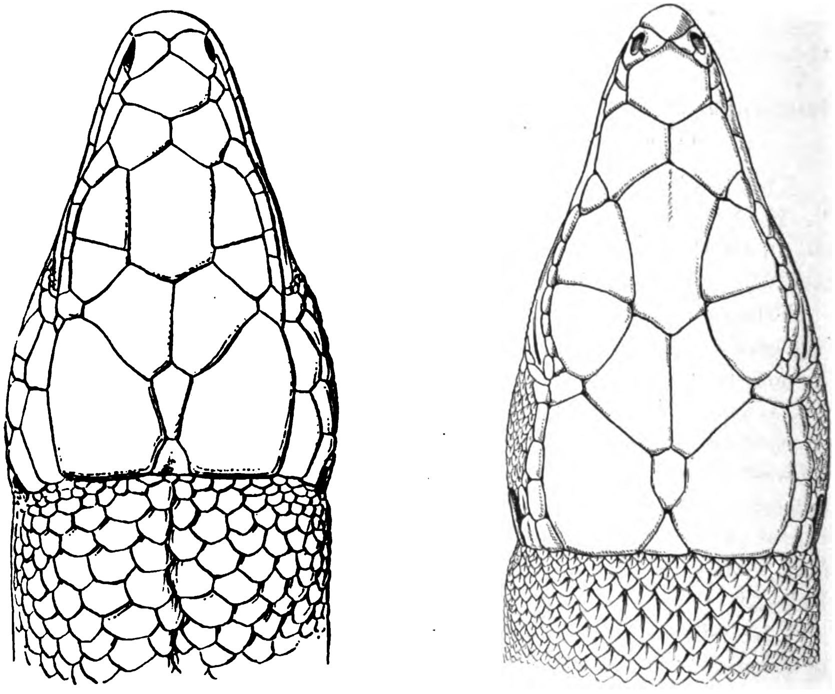


Fig. 15. The nasal region in *Algiroides*. *Algiroides moreoticus* (A, after Bedriaga); *Algiroides alleni* (9528); *Algiroides africanus* (10672).

cation can, however, apply a rigid system with definite category of "generic characters" — witness the keeling of the subdigital lamellæ in the present family (especially in *Philochortus*, recently revised by Boulenger, 1917, Proc. Zool. Soc. London, p. 145). In *Algiroides alleni* Barbour, from Mt. Kenia, also with only two nasals, the nostril borders the first labial or is separated from it by a very narrow rim, as in the Mediterranean species; and with this geographical link, there seems no necessity for the retention of the name *Adolfus*. The only alternative is the admission of both *Adolfus* and *Algiroides* in East Africa, unless, indeed, a third genus be created for *A. alleni*.

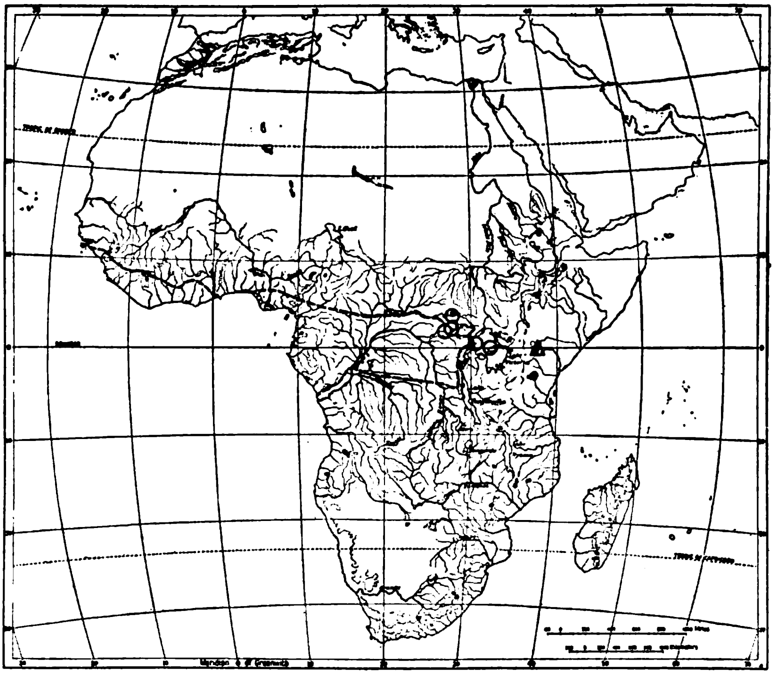


M.C.Z. 9282

A.M.N.H. 10672

Fig. 16. Dorsal views of head of *Algiroides alleni* (type, M. C. Z. 9282, × 4.75; courtesy of Dr. Barbour), and *Algiroides africanus* (A. M. N. H. 10672 × 5).

Adolfus fridericianus Sternfeld was founded on a specimen from Avakubi, and there can be no question that the present series belongs to the same species. *A. fridericianus* is distinguished from *A. africanus* by the fewer



Map 13. Distribution of *Algiroides* in Africa.
△ *Algiroides alleni.*
○ *Algiroides africanus.*
Algiroides may be considered an eastern element in the Ituri fauna.

dorsal scales, the presence of a gular fold, and the higher number of scales between the collar and chin shields. These characters are compared with the range in the present series below:

	Dorsals	Collar to Gulars	Collar	Ventrals	Fem. Pores
A. africanus	24	19	6	18	13–15
A. fridericianus	19	25	9	20	15–15
Present series	18–24	18–30	6–9	18–23	12–17
A. africanus (*non* Blgr.) Peracca	?33	25	6	22	9–9

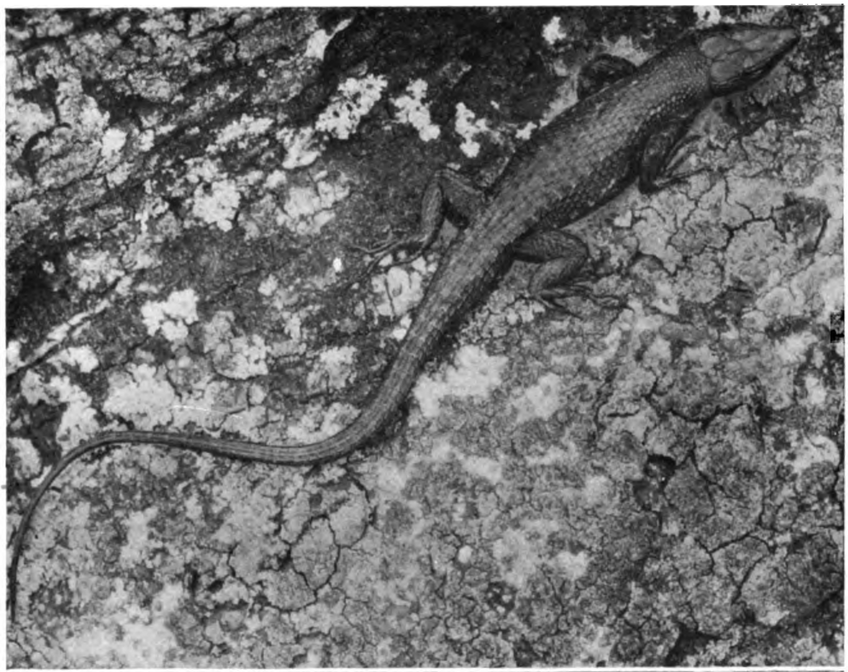
Since the gular fold is present in some and absent in other specimens and the coloration is variable, there can be little question of the identity of *africanus* and *fridericianus*.

The specimen from Fort Portal, Uganda, recorded by Peracca, falls so far outside the limits of variation here established that it may require dis-

PLATE XXIII

Figure 1. *Algiroides africanus* Boulenger. A. M. N. H. No. 10534; ♂; length 163 mm.

Figure 2. *Holaspis guentheri* Gray. A. M. N. H. No. 10709; ♂; length 118 mm.



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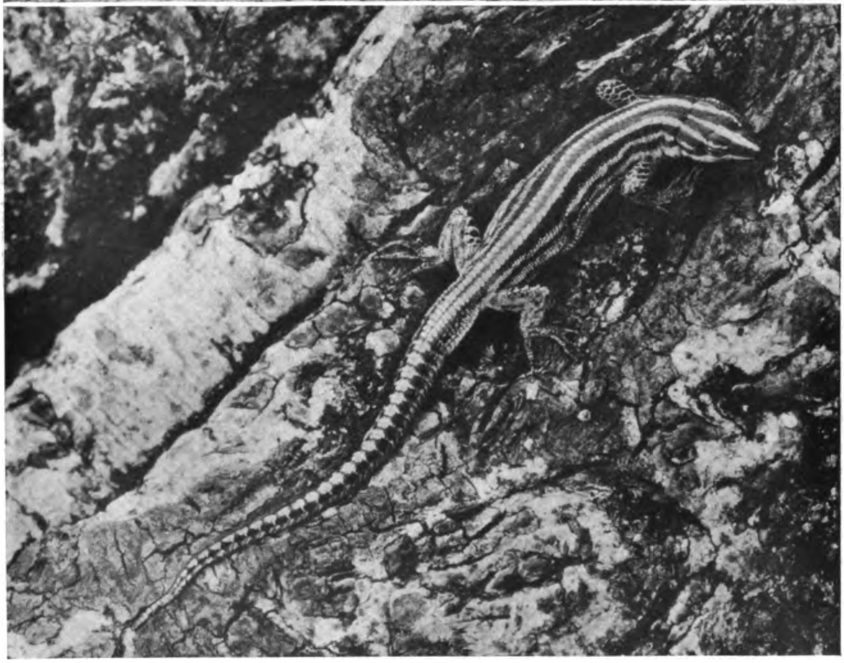

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tinction as a third African species of *Algiroides.* The scale count of thirty-three, however, may include the ventrals, in which case the difference is greatly reduced; and it is impossible to judge the importance of the difference in number of femoral pores from a single specimen.

Algiroides alleni Barbour (1914, Proc. New England Zool. Club, IV, p. 97), described from a series of specimens collected by Dr. Glover M. Allen on Mt. Kenia, is of exceptional interest in its closer relations with the Mediterranean species of the genus (at least in the character of the nostril above discussed). Through the kindness of Dr. Thomas Barbour, the writer had the privilege of examining the type and paratypes of this species at the Harvard Museum of Comparative Zoology and Dr. Barbour has supplied the accompanying drawing (Fig. 16).

Direct comparison with *africanus* considerably increases the distinctness of *alleni.* It has a more slender body, a shorter head, and a much stouter tail. The outline of the head from the side is convex, straight or even concave before the eyes in adult *africanus.*

The more weakly keeled scales (cf. the original description) are very distinctive. The laterals and anterior dorsals are entirely smooth and none of the keels approach those of *africanus* in distinctness.

The prefrontal is wider than long in *alleni,* as long as wide in *africanus.* The frontal is short with parallel sides, elongate and wider anteriorly in *africanus.* The granules between supraoculars and supraciliaries, entirely absent in *alleni,* are well developed in *africanus,* hiding the supraciliaries if the head is viewed from above. Finally, the nostril, as above reported, is bordered by the first labial and two nasals.

In the present series the ventrals are uniformly in six longitudinal rows posteriorly, four anteriorly; the scales of the median rows are as long as wide, the second row the widest; the scales of the outer row are more or less keeled; the transverse rows vary from eighteen to twenty-three. The strongly keeled imbricate or subimbricate dorsals vary in number from eighteen to twenty-four across the body and from thirty-eight to forty-eight from anus to occiput. The keels converge more or less toward the median line. One specimen has the keels of the seven enlarged dorsal rows continuous and nearly parallel to the median axis, while those of the lateral rows are alternate. The dorsal rows are considerably larger than the lateral, the gradation sometimes uniform, more usually the seven or eight mid-dorsal rows rather sharply defined. The number of scales in the collar varies from six to nine, including the small keeled scales at the sides. The scales between collar and gular symphysis vary from eighteen to thirty. A gular fold (as described by Sternfeld) often faint, usually absent, sometimes well marked. A lateral horizontal fold from the lower side of the ear toward the collar usually more distinct. The femoral pores vary from 12–12 to 17–17, the higher numbers more frequent in the males.

The scutellation of the head is interesting in the number of its variations. In seventy-five specimens the parietals are separated by the interparietal and the occipital; in seventeen they meet in a point; and the parietals form a more or less extensive suture in the remaining fifty-one. The interparietal is transversely divided in two specimens; it is absent in six specimens; and it may be cut off from the frontoparietals by an anterior parietal suture. The nasals usually meet behind the rostral, separated by a suture between rostral and frontonasal in three cases. The prefrontals are narrowly separated by the frontal and frontonasal in one specimen. Five specimens have a small azygous plate between the prefrontals. The upper labials anterior to the subocular are normally five, varying from four to six. The nostril is in every case separated from the first labial, pierced between two nasals, above or just behind the rostral first labial suture.

The coloration in life, according to the field notes, is as follows: head reddish brown above; a brownish green dorsal band, more brownish anteriorly, continuing on the tail. This band extends on the seven or eight enlarged dorsal scale rows, is outlined with a row of yellow spots on each side, and bears one or two rows of widely separate dark spots centrally. The sides are dark brown, with a row of yellow spots at the edge of the ventrals, which are a vivid green. A more or less noticeable light line below the ear, on the longitudinal fold.

The stomachs contained a spider (No. 10591), cockroaches (Nos. 10559, 10569, 10595, and 10661), a cricket (No. 10568), grasshoppers and caterpillars (Nos. 10610 and 10630), and a species of Reduviidæ (No. 10595).

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	59	109–181	155.3 mm.
	♀	33	111–177	153.7 mm.
	Juy.	7	65–104	86.4 mm.
Body	♂	86	40–60	53.6 mm.
	♀	47	40–63	56.4 mm.
	Juv.	10	26–38	32.9 mm.
Tail	♂	59	69–125	102.7 mm.
	♀	33	70–113	97.1 mm.
	Juv.	7	39–69	54.3 mm.
Tail/Length	♂	59	.61–.69	.654
	♀	33	.60–.67	.628
	Juv.	7	.59–.65	.623

	Sex	No. of Specimens	Extremes	Average
Axilla to Groin	♂	86	21–32	27.5 mm.
	♀	47	22–36	30.5 mm.
	Juv.	10	14–21	17.2 mm.
Arm	♂	86	15–25	21.8 mm.
	♀	47	15–25	21.9 mm.
	Juv.	10	11–16	13.2 mm.
Leg	♂	86	21–38	32.5 mm.
	♀	47	22–36	32.0 mm.
	Juv.	10	15–22	19.1 mm.
Head Length	♂	86	11.0–16.5	14.4 mm.
	♀	47	11.0–16.0	14.2 mm.
	Juv.	10	7.5–11.0	9.2 mm.
Head Breadth	♂	85	7.0–10.8	9.2 mm.
	♀	47	7.0–10.5	9.1 mm.
	Juv.	10	5.0–7.0	6.0 mm.
Transverse Ventral Scale Rows	♂	86	17–23	19.7
	♀	47	18–23	21.1
Longitudinal Dorsal Scale Rows	♂	86	18–23	20.3
	♀	47	18–24	20.2
Scales from Collar to Gulars	♂	86	18–27	22.7
	♀	47	19–26	23.5
Femoral Pores (total/2)	♂	86	13–17	14.7
	♀	47	12–16.5	14.0

"*Algiroides africanus* shows considerable variation in color phases, and while the one described above is typical, some specimens are more uniform, with the greenish brown dorsal band less conspicuous or absent, whereas in others the brown and green shades may be even more intense. The rough, peculiarly shaped body scales are well shown on Plate XXXIII, Fig. 1. The females are slightly smaller than the males, which seldom exceed seven inches in length.

"These lizards were never seen in villages but sometimes on the road, where, however, they ran along wooden beams of bridges or among heaps of stones. The higher lying rocky portions of the forest are their real haunts and most of the specimens in the collection were caught under fallen timber in the extensive clearings made by the Medje in 1914. They usually basked on trees and stones, but hunted for food among the dry leaves and other rubbish of the ground. They were especially fond of spiders, roaches, grasshoppers, and crickets, and a few had also fed on caterpillars, beetles, ants and their larvæ" [H. L.].

Ichnotropis Peters

Synopsis of the Species of *Ichnotropis*

A. Frontonasal divided longitudinally, subocular cut off from lip, no distinct occipital . . . . *squamulosa.*

AA. Frontonasal single, subocular bordering lip, a distinct occipital.

  B. Frontal square anteriorly, a pair of small anterior supraloreals. *chapini.*

  BB. Frontal more or less pointed anteriorly, no small anterior supraloreals.

    C. Hind limb not reaching ear . . . . *capensis.*

    CC. Hind limb reaching ear or beyond . . . . *macrolepidota.*

Ichnotropis chapini, new species[1]

Text Figure 17; Map 14

A single specimen (A. M. N. H. No. 10674) from Aba, July 1911, requires distinction as a new species.

The distribution of the species of this genus is of considerable interest. *Ichnotropis capensis* (Smith) is southern, extending farthest north in Angola, where it is the sole species, but, curiously enough, unrecorded from German Southwest Africa. *Ichnotropis macrolepidota* Peters appears to be derived directly from *capensis,* probably replacing it in Matabeleland and northern Rhodesia. *Ichnotropis squamulosa,* a very distinct form, overlaps much of the range of *capensis* and probably all of that of *macrolepidota* and extends much farther north than these, into German East Africa, reaching also Angola to the west. The present form, known only from the Sudan, is closely allied to *capensis,* consequently there is a very wide gap in the distribution of the *capensis* group.

Diagnostic characters

Habitus as in *Ichnotropis capensis,* to which it is closely allied. Hind leg not reaching axilla; head shields very rugose; frontonasal undivided; an occipital; a supraloreal between the frontonasal and the anterior loreal; an auricular shield. Anterior border of frontal square.

Detailed description

Type: A. M. N H., No. 10674.

Habitus lacertiform; body slender; legs short; tail .56 of the total length (.57 in *capensis*). Head shields very rugose, except nasals and anterior loreals,

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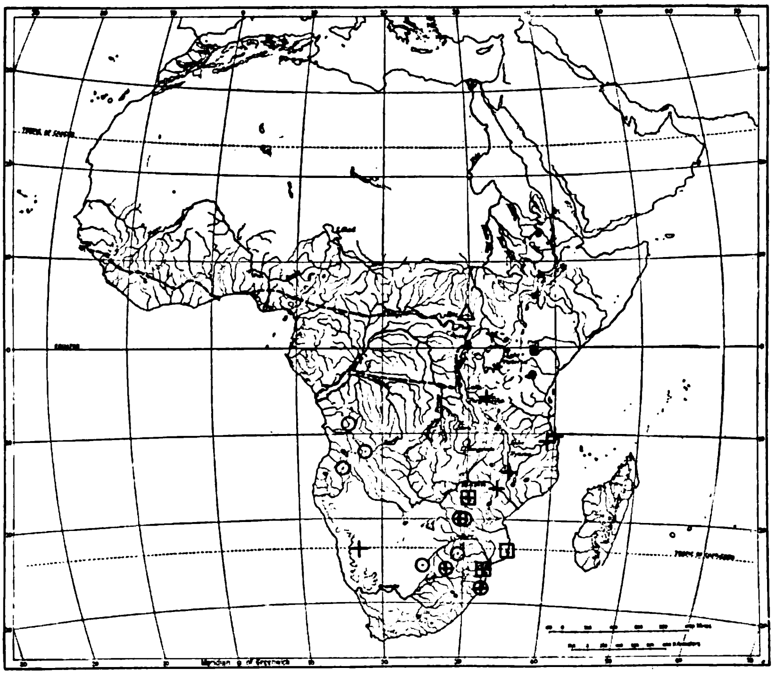
[1] *Ichnotropis chapini.* Named in honor of Mr. James P. Chapin, who accompanied Mr. Lang on the American Museum's Congo Expedition, and prepared in the field a valuable series of color sketches from life of many of the species included in this paper.



Map 14. Distribution of *Ichnotropis* in Africa.

○ *Ichnotropis capensis.*
☐ *Ichnotropis macrolepidota*, probably a northeastern subspecies of *capensis*.
△ *Ichnotropis chapini.* Closely related to *capensis* but widely separated in range.
+ *Ichnotropis squamulosa.* Represents a distinct section of the genus.

about as in *squamulosa*, more so than in *macrolepidota*. Rostral nearly as high as wide, five-sided, pointed above, narrowly separated from the frontonasal by the superior nasals. Nostril circumscribed by three nasals, an anterosuperior, an inferior, and a very small posterior, the latter much smaller than observed in *macrolepidota* and *squamulosa*. A smooth supraloreal between the two upper nasals, the frontonasal, prefrontal, anterior and posterior loreals. Frontal four-sided, with two longitudinal keels, anteriorly enclosed between the prefrontals. Four supraoculars; four supraciliaries, of which the anterior exceeds the other three, separated from the supraoculars by a series of granular scales. Frontoparietals slightly exceeded by the interparietal, which is bordered behind by an occipital. Parietal shields rounded behind, with three enlarged scales on each side. Temporals small, uniform, keeled. A curved auricular bordering the ear opening anteriorly; auricular larger than in *squamulosa* or *macrolepidota* examined. Labials 8–7, above and below, four anterior to the subocular (which borders the lip) on one side, five on the other.

Dorsal scales strongly keeled and imbricate, in twenty-five longitudinal and fifty-five transverse series. Ventrals smooth, imbricate, in ten fairly regular longitudinal series and thirty cross-rows to the arms. Twenty-three scales from brachial region to the gular symphysis. Scales of the preanal area small. Fold anterior to the shoulder faint.

General color grayish brown above. A lateral white stripe originating on the subocular, outlined above and below with black, passes above the arm, but does not reach the hind leg. A very faint dorsolateral line above this (visible only when in alcohol). Between these lines on the sides is a series of transverse black spots, two or three scales wide and half a scale long, on the tips of scales; two series of similar transverse markings dorsally, one on each side of the median line, extending to the longitudinal dorsolateral stripe. Ventral scales and chin shields white, outlined with gray, the two outer rows of ventrals punctate with brown dots. Lower and upper labials mottled with light and dark. Limbs grayish brown above, light beneath.

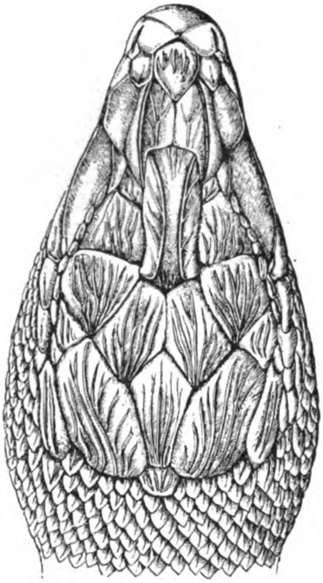


Fig. 17. Head of *Ichnotropis chapini*, (type, 10674, × 5).

Measurements of A. M. N. H. No. 10674 (♀): length, 135; body, 58; tail, 77; axilla to groin, 33: snout to arm, 21; arm, 18; leg, 28; head length, 14; head breadth, 8 mm.

Eremias Wiegmann

Key to the Species of *Eremias* Recorded from the Sudan, in the Restricted Sense of the Present Paper

A. Supraoculars entirely surrounded by granules; head shields striate; ventral plates in six longitudinal series; subocular cut off from the lip. *spekii sextæniata.*

AA. Supraoculars in contact with the frontal.
  B. Ventrals in ten longitudinal series; femoral pores 21–21. *guineensis*.[1]
  BB. Ventrals in six longitudinal series; femoral pores 12–15. *nitida*.
    C. Dorsal scales, 42 .... *nitida nitida*.
    CC. Dorsal scales, 51 .... *nitida nigerica*.
    CCC. Dorsal scales, 59 .... *nitida garambensis*.

Eremias nitida Günther

Eremias nitida Günther, 1872, Ann. Mag. Nat. Hist., (4) IX, p. 387. Boulenger, 1887, Cat. Lizards, III, p. 83. Tornier, 1901, Beiheft, Arch. Naturg., LXVII, p. 73.
Eremias nitida nigerica Klaptocz, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 282.

Eremias nitida garambensis, new subspecies

Text Figures 18 and 19

A distinct new form is represented by thirty-four specimens: A. M. N. H. Nos. 10682–705 (May 1912), 10706–08 (June 1912) are from Garamba; 10678–81 (April 1912), Vankerckhovenville; 10675–77 (November 1911), Yakuluku.

The zoogeographical relations of the part of the Sudan reached by the present expedition with the West African region north of the Forest (Upper Niger to Senegal) have been exemplified in a number of species. The present form exhibits the same relationship, in that it is allied to the West African species of the genus. The above localities probably represent the eastern border of its range, since it was not taken by Werner on the Nile, one hundred miles to the northeast, where a distinctively East African species, *E. spekii sextæniata* Stejneger, was found (Werner, 1907, Sitzber. Akad. Wiss. Wien, math.-natur., CXVI, part 1, p. 1845).

Diagnostic characters

Head shields smooth, no granules on inner sutures of the supraoculars. Lower nasal undivided, resting on the first labial only, in contact with the rostral. Interparietal narrow reaching the occipital or cut off from it. Ventrals in six straight longitudinal series. Dorsal scales keeled, fifty-eight across the body.

Detailed description

Type: A. M. N. H., No. 10686.

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[1] This species is described from Brass, Mouths of the Niger, within the forest area. It has not been rediscovered, and the writer regards its occurrence there as accidental. Probably a Sudanese species.

Habitus typical of the genus; head and limbs moderate, the hind limbs reaching between collar and ear; tail more than two-thirds the total length. Head rather high; snout long, obtusely pointed.

Nostril between three nasals, not at all swollen; the lower above the first labial, narrowly in contact with the rostral; the upper forming a median suture; the small posterior wedged between the anterior loreal and the frontonasal. Frontonasal two-thirds as long as wide. Prefrontals four-sided, with median suture as long as the frontonasal. Frontal as long as its distance from the rostral, shorter than the parietals. Interparietals regular, posterior sides convex. Parietals large with elongate shield on each side for three-fourths of their length. Interparietals small, elongate, separated from the small occipital by a parietal suture. An auricular shield on the superoanterior border of the ear opening. Temporals small, smooth. Oculars four, the second and third large. Supraciliaries six, separated from the oculars by a row of small uniform granules. Five labials anterior to the subocular, which is moderately narrowed beneath. Second loreal in contact with the first ocular.

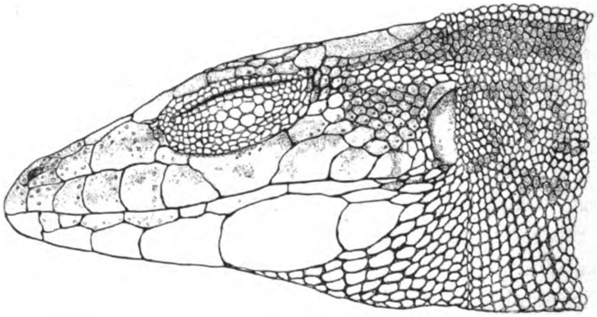


Fig. 18. Head of *Eremias nitida garambensis*, (type, 10686, × 4.3).

The dorsal scales are small, keeled, rhomboidal, juxtaposed, sixty across the body, about one hundred and fifty from the anus to occiput, about three rows corresponding to one of the ventrals. Ventrals in twenty-six transverse series and six longitudinal, of which the middle two are narrowest, the outer two rows on each side equal. Collar serrate, of eight plates, with thirty-one scales between it and the gular symphysis. Five pairs of chin shields, the anterior two in contact. Gular fold well developed.

A very striking and handsome color pattern. In the young and middle-sized specimens the ground color of the back and sides is black, becoming brownish posteriorly, the tail brown. On this ground color are six light lines; the two lateral, about two scales wide, are more or less broken up into spots, especially above the arm, originate on the subocular, and continue to the hind leg. The second line on each side, also two scales wide, begins at the lower posterior corner of the eye and continues on the base of the tail; sometimes slightly zigzag on the sides, rarely slightly broken. The two median lines are more brownish than the lateral and very even edged, two to three scales wide. They merge posteriorly into the brown of the tail. Anteriorly, at some distance from the parietals, they bifurcate, the outer branches going to the outer corners of the parietals, the inner to the inner corners, including the occipital between them; sometimes less widely separated, they do not reach the corners but start from the middle third of the posterior border of the parietals. The black above the first lateral line continues to the end of the tail, which is orange brown in youngest specimens. In the males a row of five to seven large, blue-edged, light ocelli lies between the ventrals and the first lateral line, the first over the arm, the last just behind the hind leg.

Measurements of the type: Length, 225 mm.; body, 60 mm.; tail, 165 mm.; tail/length, .73; axilla to groin, 36 mm.; snout to arm, 21 mm.; arm, 19 mm.; leg, 37 mm.; head length, 15 mm.; head breadth, 9 mm.

This pattern is still visible in the largest specimens, in which it is obscured by the anterior invasion of the brown of the tail and by the breaking up of the black interspaces into light brown and black cross-bars, often very irregular, scarcely visible on the back, but often very strong on the sides. Venter yellowish white. Hind limbs brown with round light spots above. Arms irregularly marked with brown and black.

The interparietal is sometimes in contact with the small occipital. The latter may be transversely divided, or absent. The anterior ocular may subdivide into two or three plates. The supraciliaries vary from five to six. The loreal region shows a triangular interloreal in one specimen, a small supraloreal in another. The labials before the subocular are 4–4 in two specimens, 4–5 in three, 5–5 in twenty, 5–6 in four, 6–6 in one. The scales in the collar number from eight to thirteen, the scales between the collar and gulars from twenty-six to thirty. Two or three pairs of gulars in contact. Longitudinal series of ventrals twenty-five to thirty-one. Number of dorsals in a transverse row fifty-two to sixty-four, mean fifty-nine.

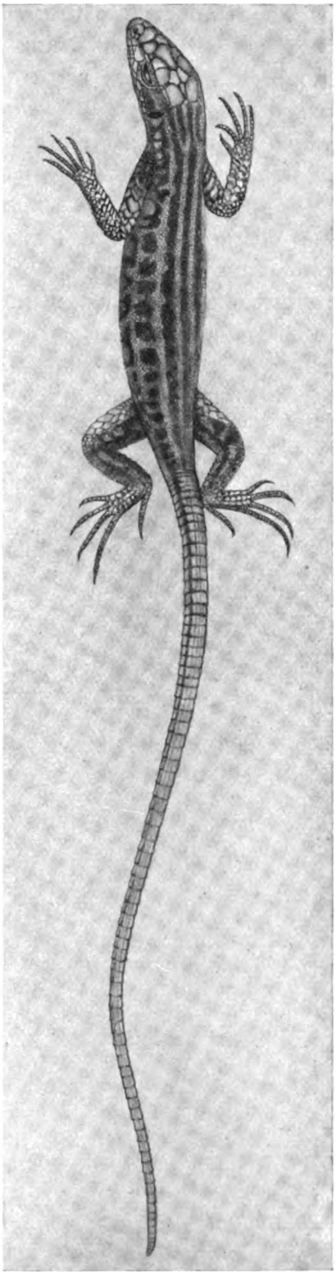


Fig. 19. ***Eremias nitida garambensis*** **(10682, × 1). To show color pattern.**

The relationship with *Eremias nitida nitida* Günther appears to be close, the chief distinctions being the much reduced interparietal, the higher number of scale rows across the back, and probably the bifurcation of the dorsal lines. This gap is bridged by *Eremias nitida nigerica* Klaptocz, in which the dorsal scales are fifty-one, (forty-two in *nitida nitida*, fifty-eight in this series), the interparietal narrower, and the coloration very similar, but apparently without the forked dorsal lines which seem a very striking and characteristic feature in the present subspecies. These relations, of course, may be found on the examination of a larger series of the western forms to be either more distant or closer.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	14	104–225	177.9 mm.
	♀	16	95–229	173.9 mm.
Body	♂	14	33–61	51.0 mm.
	♀	16	32–65	52.7 mm.
Tail	♂	14	71–165	126.9 mm.
	♀	16	63–164	122.5 mm.
Tail/Length	♂	14	.62–.74	.71
	♀	16	.64–.73	.69
Axilla to Groin	♂	14	22–36	29.7 mm.
	♀	16	17–40	30.0 mm.
Arm	♂	14	13–19	16.8 mm.
	♀	16	11–18	15.8 mm.
Leg	♂	14	26–37	31.9 mm.
	♀	16	19–34	30.0 mm.
Head Length	♂	14	11–15	13.1 mm.
	♀	16	9–14	13.5 mm.
Head Breadth	♂	14	6.0–9.0	7.7 mm.
	♀	16	5.0–8.2	7.4 mm.
Ventrals, Transversely	♂	14	25–28	26.9
	♀	16	27–31	28.5
Dorsals, Transversely	♂	14	56–62	58.5
	♀	16	52–64	58.7
Femoral Pores (total number)	♂	14	22–28	25.6
	♀	16	23–28	24.8

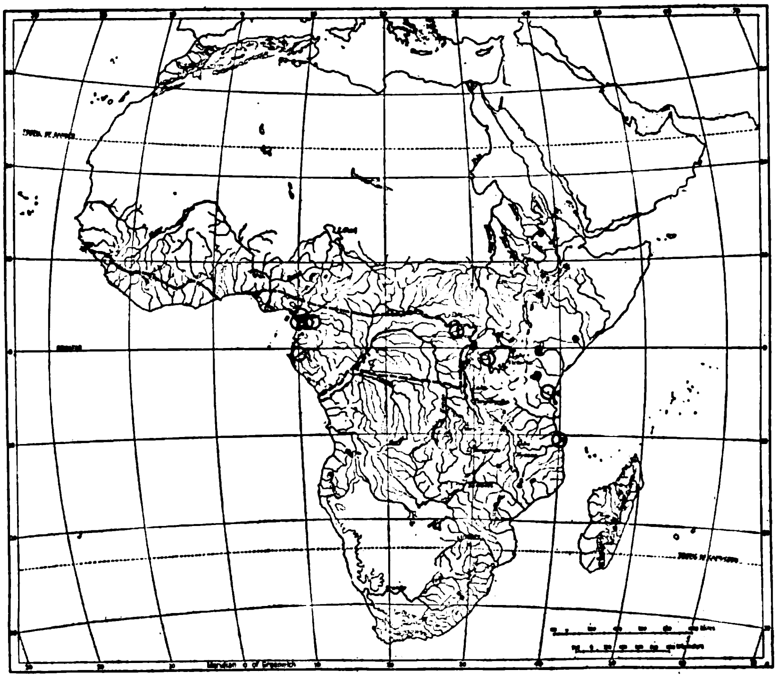
Holaspis Gray

Holaspis guentheri Gray

Plate XXIII, Figure 2; Text Figure 20; Map 15

Holaspis guentheri Gray, 1863, Proc. Zool. Soc. London, p. 153, Pl. xx, fig. 1; 1864, Ann. Mag. Nat. Hist., (3) XIII, p. 103. Müller, F., 1885, Verh. Naturf. Ges. Basel., VII, p. 702. Boulenger, 1887, Cat. Lizards, III, p. 118. Matschie, 1892, Sitzber. Ges. Naturf. Freunde Berlin, p. 110. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 40. Boulenger, 1900, Proc. Zool. Soc. London, p. 449. Tornier, 1900, Zool. Jahrb. (Syst.), XIII, p. 593; 1902, Zool. Jahrb. (Syst.), XV, pp. 582 and 674. Müller, L., 1910, Abh. Bayerischen Acad. Wiss. 2 Kl., XXIV, p. 560. Nieden, 1910, Fauna Deutschen Kolonien, Reihe I, Heft 2, p. 19. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exped., IV, p. 199. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 79. Werner, 1913, Denkschr. Akad. Wiss. Wien (math.-natur.), LXXXVIII, p. 717.

Holaspis guentheri lævis Werner, 1895, Verh. Zool.-Bot. Ges. Wien, XLV, p. 191.



Map 15. Distribution of *Holaspis guentheri*. A forest species occurring also in East Africa.

The collection contains eleven specimens of this aberrant lacertid: A. M. N. H. Nos. 10709 (April 1914), 10710–18 (June 1914), and 10719 (July 1914) from Medje.

The species has not hitherto been recorded from the Ituri region, being known from the Kamerun-Gaboon district in West Africa and from German East Africa, where it ranges from Lake Victoria (Bukoba) to the coast. It is the distribution of true forest species like the present which lends support to the theory of a former greater extension of the continuously forested area.

There seems to be no reason for retaining Werner's subspecies *lævis* for the East African members of the species, as Tornier (1897, p. 40) has shown. The original description of Gray and that of Boulenger (1887, p. 118) were founded on a single immature specimen. The present series is in entire agreement with Tornier's remarks, the dorsolateral scales being smooth and the femoral pores nineteen to twenty-four.

The coloration in alcohol is that described by Werner for *lævis* (1895, p. 191), but the field notes indicate that this is radically different in life. The bluish venter is orange, the dorsal blue lines pale yellow, and only the tip of the tail is blue. The lower jaw and throat are pale grayish green, as is the lower side of the fore limbs. The limbs are black above, the large scales edged with yellow. Sides yellowish green. Lower side of tail yellowish, with dark bars, more pronounced toward the tip, which is blue beneath (as above).

The tabulation of measurements and scale characters shows the range of variation in the present series.

The writer is inclined to believe that the lateral denticulation of the tail, which is directed somewhat downwards, as well as the similar expansion on the bases of the toes and on the inner edge of the hind leg (Fig. 20) and the keeling of the lower scales of the tail toward its tip, may best

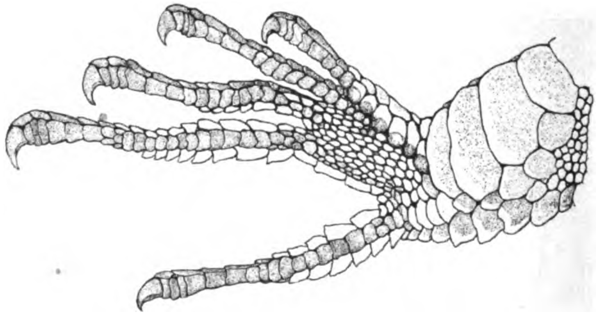


Fig. 20. Plantar view of foot of *Holaspis guentheri* (10718, × 5.2). To show lateral denticulation and modified scales.

be regarded as a tree-climbing adaptation. A peculiar character in this species consists of the fusion of the third and fourth fingers for nearly their entire first joint.

The anterior row of plantar scales is enlarged and they are remarkable in the possession of soft pads on the downwardly directed (inner) half, while the outer and lateral half is hard, like a normal scale.

Apparently only two eggs reach full development in this species and these eggs become relatively very large. No. 10717 contained two eggs on each side, .5 mm. long; No. 10716 contained 1 + 1 eggs, 12 × 6.3 mm. Both of these specimens were captured in June. No. 5275, from Kamerun, without a date, contained 1 + 1 eggs, 11 × 5 mm.

Measurements and Scale Characters

A. M. N. H. No.	10709	10710	10711	10712	10714	10715	10716	10717	10718	10719
Sex	♂	♂	♂	♀	♂	♀	♀	♀	♀	♂
Femoral Pores	22–22	23–23	22–22	18–19	24–24	19–21	19–19	20–20	21–21	22–23
Length	118	109	[117]	106	109				[85]	[88]
Body	52	52	52	51	48	24	49	38	50	51
Tail	66	57	[65]	55	61				[35]	[37]
Tail/Length	.56	.52		.52	.56					
Axilla to Groin	30	29	29	29	28	12	28	21	28	27
Snout to Arm	19	19	19	18	18	11	18	14	16	19
Arm	17	18	17	15	16	7	15	12	14	17
Leg	24	23	24	22	22	10	22	16	21	23
Head Length	12	12.2	12.2	11	11.5	6.3	10	9	10.5	12
Head Breadth	8	8	7	7	8	4	6.2	6	7	7.6
Ventrals, Transversely	6	6	6	6	6	6	6	6	6	6
Ventrals, Longitudinally	27	27	28	30	28	27	30	30	30	27
Dorsals, Transversely	58	60	62	64	72	56	60	66	62	66
Dorsals, Longitudinally	57	54	53	51	55	55	53	55	52	52
Collar Scales	11	9	10	7	11	11	11	10	10	11
Scales Collar-gulars	29	26	28	28	27	30	25	30	27	31

"Our largest specimen measures three and a quarter inches (118 mm.) in length and represents one of the most conspicuously colored lizards seen in the Rain Forest. The yellow markings of the upper side contrast strongly with the glossy black and merge on the sides into pale green, which extends to the bright orange of the venter. On the tail the series of spines is olive-yellow and the tip blue.

"All of the specimens were collected among the fallen timber in clearings recently made, and were never seen in or near villages. Its remarkable adaptations to arboreal life enable it to glide on trees and even the lower surface of smooth boughs with such ease that at first sight it reminds one of a gecko. Other arboreal lizards run up and down rough tree trunks with perhaps greater facility, but their movements are dependent on the grip taken with the claws, for the ventral surface and tail are generally carried free and contribute nothing to their hold; but *H. guentheri* slips along with body and tail pressed close to the surface. The head, body, and even the thigh are singularly flattened; the smoothness of the large scales of the belly and lower jaw, facilitating unhampered gliding, is in contrast with the roughness of the tail, provided with lateral serrations directed outward, downward, and backward. These and other adaptations cited below assist in climbing, a process greatly aided by the facility with which the tail adjusts itself to the shape of the supporting surface. The flatness of the belly, with the ridges of scales fore and aft, and the slightly overhanging edge of finely scaled skin on the sides have suggested that through some muscular arrangement a temporary suction is produced, completely securing it to the bark, which in these forests is often smooth and devoid of moss and lichens.

"These lizards were seen singly and are extremely shy and difficult to approach. Two were found in the early morning hiding beneath large pieces of bark, and as a result of the dampness had lost their usual agility. The conspicuous yellow markings, well shown in Plate XXIII, Figure 2, are not dependent on the intensity of the sunlight, as is the case with the brilliant blue of a male *Agama*, yet the orange, green, and blue tints are dull when seen in hiding places in the early morning. Their food consists of various ants, earwigs, and small beetles and their larvæ" [H. L.].

GERRHOSAURIDÆ

Gerrhosaurus Wiegmann

Synopsis of the Genus *Gerrhosaurus* (Based on Boulenger, 1910, p. 480)

A. Ventral shields in 14–16 longitudinal series; tympanic shields large, crescentic; 18–20 femoral pores on each side. . . . . *validus*.

AA. Ventrals in less than 14 rows.

  B. Ventrals in 10 longitudinal series.

C. Tympanic shield large, crescentic; dorsal scales in about 56 transverse series; 15–18 femoral pores on each side. . *typicus*.

CC. Tympanic shield small; dorsals in 32–37 transverse series; femoral pores 11–14.

  D. Dorsal color uniform brown. . . . . *major*.

  DD. Dorsum spotted with yellow.

    E. Yellow spots on the scales (Zululand). . . . *grandis*.

    EE. Yellow spots on the sutures between the scales.

      F. (Eritrea). . . . . *bottegoi*.

      FF. (Togo-Uele) . . . . *zechi*.

BB. Ventrals in 8 series.

C. Tympanic shield large, crescentic; no strongly marked dorsolateral stripe; dorsals in 50–52 transverse series. (German Southwest Africa; known only from the unique type.) *auritus*.

CC. Tympanic shield narrow; a dorsolateral stripe; dorsals in 54–64 transverse rows. . . . . *flavigularis*.

  D. Dorsal scales in a transverse row 20–26, mode 22 (South and East Africa). . . . . subsp. *flavigularis*.

  DD. Dorsals 24–28, mode 26 (Angola, Lower Congo). subsp. *nigrolineatus*.

Gerrhosaurus zechi Tornier

Plate XX, Figure 2; Text Figure 21; Map 16

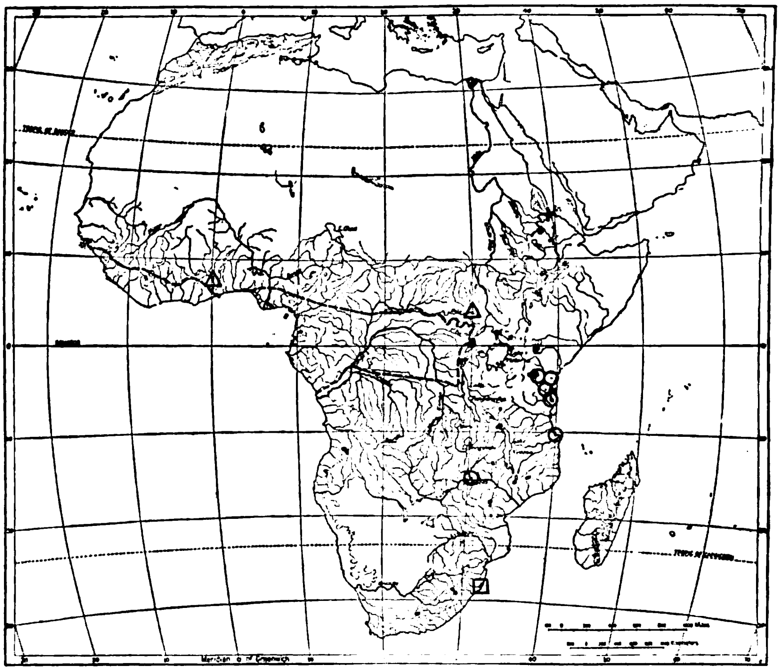
?*Gerrhosaurus bottegoi* Del Prato, 1892, Atti Soc. Italiana Sci. Nat., XXXV, p. 20, fig. 1.

Gerrhosaurus maior zechi Tornier, 1901, Beiheft, Arch. Naturg., LXVII, p. 74.

Three specimens of this interesting lizard were collected: A. M. N. H. Nos. 10720–21 (May 1912) and 10722 (June 1912) from Garamba.

The writer has been unable to discover any distinction of specific value between *Gerrhosaurus zechi* and *Gerrhosaurus bottegoi;* but Tornier's name is provisionally retained because it seems probable that differences of at least subspecific value could be discovered if a series of the Eritrean form were available. The geographical relations between the Uele region and Togo are much closer, at any rate, than with Eritrea, and the question will be cleared up by future collections.

Gerrhosaurus zechi is the widest ranging species of the genus, which is essentially South African. *Gerrhosaurus zechi*, *Gerrhosaurus bottegoi*, *Gerrhosaurus major,* and *Gerrhosaurus grandis* seem to be a group of closely related forms, some of which may be found to intergrade. Their distribution is indicated on Map 16.



Map 16. Distribution of the species of *Gerrhosaurus* related to *G. major.*

○ *Gerrhosaurus major.* East African.
□ *Gerrhosaurus grandis.* South African.
△ *Gerrhosaurus zechi.* Sudanese.
+ *Gerrhosaurus bottegoi.* Abyssinian (probably identical with *zechi*).

Tornier (1901, p. 77, figs. 2 and 3) has given an excellent account of the variations in the head squamation of *Gerrhosaurus major.* Since an inter-nasorostral shield has been observed in *major,* and as *zechi* varies in an exactly analogous way, this character is of no value for the distinction of *Gerrhosaurus bottegoi.* Tornier's two figures illustrate the general arrangement of the head shields in the largest and smallest of the present specimens. The change in the form of the frontal with age is observable in other lizards, notably in *Bedriagaia tropidopholis.* Further variations are shown in the figure of No. 10722, in which a small shield is cut off from each anterior nasal to form a double inter-nasorostral, while the instability of the head shields extends to the supraoculars (Fig. 21). Far from regarding such variations as pathological, the writer would consider the instability in question one of the characters of the species.

The coloration is relatively much more constant. The outer four dorsolateral scale rows on each side, and the lower edge of the fifth, are chestnut. The dorsal space between these is black in ground color, with a yellow spot on the lateral suture between each of the scales. These spots are confluent on the sutures between the fifth and sixth scale rows and continue as a yellow line on the tail. The interrupted lines between these indicate the mode of augmentation of the dorsal scale rows very clearly. With fourteen on the neck, a median row is added at the seventh vertical from the parietals, the middle row of spots being replaced by two; on the eleventh vertical the median scale is replaced by two, and a median row of yellow spots begins; at the twentieth vertical another median scale is added, the row of spots again dividing into two. Reduction takes place in the reverse order, beginning at the thirty-second scale row, above the hind legs. A row of lateral scales is added on each side between the legs, making the total number of longitudinal dorsal scale rows nineteen if counted between the twentieth vertical and the hind legs.

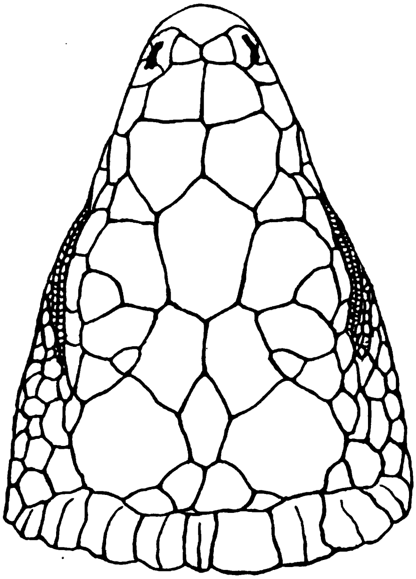


Fig. 21. Head of *Gerrhosaurus zechi* (10722, × 2.3). Showing two internasals and supernumerary oculars.

The sides of the tail are more or less distinctly marked with light lines no the sutures of the scales, while the sides of the body are entirely uniform or posteriorly lined with yellow.

The head is black with yellow markings, chiefly on the sutures but somewhat irregularly disposed. The interparietal and each side of the parietals have a yellow spot in the middle. The keeled or rugose scales of the outer and upper sides of the limbs are yellow-spotted on their sutures. The venter is grayish brown.

The coloration of *Gerrhosaurus grandis* in South Africa appears to differ from that of *zechi* in having the yellow spots on the scales instead of between them, as is also stated to be the case in *Gerrhosaurus validus*.

Measurements and Scale Characters

A. M. N. H. No.	10720	10721	10722
Sex	♂	♂	♀
Femoral Pores	12–14	12–14	13–13
Length	375	455	302 mm.
Body	181	203	129 mm.
Tail	194	252	173 mm.
Tail/Length	.52	.53	.54
Axilla to Groin	100	113	70 mm.
Snout to Arm	61	70	47 mm.
Arm	49	52	39 mm.
Leg	63	67	51 mm.
Head Length	40	44	33 mm.
Head Breadth	28	31	24 mm.
Dorsals, Longitudinally	20	19	19
Dorsals, Transversely	37	32	32
Ventrals, Longitudinally	10	10	10
Ventrals, Transversely	49	47	46
Labials	$\frac{6\text{–}7}{5\text{–}5}$	$\frac{7\text{–}6}{7\text{–}5}$	$\frac{7\text{–}7}{5\text{–}5}$

"The habitat of these large, terrestrial lizards is really the Sudan, but we found them also in the Belgian Congo in the savannah adjoining Garamba. The heavily ridged scales on the back, the yellow-streaked, blackish upper side and broad lateral band of vinous red contrasting with the grayish white under side, and the large size, nearly a foot and a half in adult males, make these reptiles one of the striking features in their generally barren haunts. Here their liveliness and boldness of pose as they watch an intruder render them very conspicuous. When pursued they race toward their burrows in the hard ground, which are undoubtedly dug by themselves, probably during the rainy season when the moist soil makes this easy. The entrance to the refuge is so small that one is surprised to see them enter with such speed. They quickly disappear in the narrow galleries, which are several feet in length, and retire to the more spacious chamber about a foot below the surface. It is difficult to remove them from one of the channels for they not only hold on to its sides with their claws but also inflate the body considerably. The heavy tail is very flexible, but at the slightest pull breaks off and the lizard runs away apparently unhurt.

Two specimens in the collection were unearthed in widely distant plantations and one near the edge of a road, and although several others were seen, the species must be considered scarce. They miss no opportunity to bite and scratch, but when roughly handled feign death, like the Sudanese monitor, watching, however, their chance to take refuge in any suitable hollow or crevice. When freed on level ground they have the peculiar habit of running a distance and suddenly halting, sometimes with tail raised, as shown in Plate XX, Figure 2. This trait, of course, practically protects them from further pursuit when cover has been reached, especially as they remain so quiet that one is likely to tread upon them.

"Stomach contents show that the food consists chiefly of various insects commonly found on or below the surface of the ground in the savannah. Of the Orthoptera, crickets are favorites, and among beetles, even the strong protective fluid of carabids does not protect them from being gulped down. Millepeds (Polydesmidæ) are also welcome morsels. The sharp claws and vigorous limbs bring to light this small prey, for these lizards feed only during the day, when most of these creatures are hiding beneath pieces of stones, dead wood, and other objects" [H. L.].

Gerrhosaurus flavigularis nigrolineatus Hallowell

Gerrhosaurus flavigularis DUMÉRIL (*non* Wiegmann) 1856, Rev. Mag. Zool., (2) VIII, p. 418.

Gerrhosaurus nigrolineatus HALLOWELL, 1857, Proc. Acad. Nat. Sci. Phila., p. 49. PETERS, 1876, Monatsber. Akad. Wiss. Berlin, p. 118; 1877, p. 613. BOULENGER, 1887, Cat. Lizards, III, p. 122. BOETTGER, 1887–1888, Ber. Senck. Ges., p. 25. PFEFFER, 1892, Jahrb. Hamburg. Wiss. Anst., X, p. 74. BOCAGE, 1895, Herpétol. Angola, p. 35. WERNER, 1896, Jahrb. Ver. Magdeburg, p. 142. MOCQUARD, 1897, Bull. Soc. Philom. Paris, IX, p. 8. TORNIER, 1897, Kreichtiere Deutsch-Ost-Afrikas, p. 42. BOULENGER, 1900, Proc. Zool. Soc. London, II, p. 448; 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 204; 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 111; 1907, Mem. Proc. Manchester Lit. Philos. Soc., LI, No. 12, p. 8; 1910, Ann. S. African Mus., V, p. 480.

Gerrhosaurus multilineatus BOCAGE, 1866, Jorn. Sci. Lisboa, I, p. 61; 1867, p. 221. PETERS, 1881, Sitzber. Ges. Naturf. Freunde Berlin, p. 147.

Gerrhosaurus flavigularis nigrolineatus STERNFELD, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., V, p. 224.

References dealing with the relationship of this species to *G. flavigularis* Wiegmann. Tornier, 1900, Zool. Jahrb. (Syst.), XIII, p. 594; 1902, XV, p. 583. Roux, 1907, Zool. Jahrb. (Syst.), XXV, p. 429. Hewitt, 1910, Ann. Transvaal Mus., II, p. 103; 1911, III, p. 49. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 80.

There are twenty-six specimens of this subspecies in the collection: A. M. N. H. Nos. 10744–45 (August 1915) are from Banana; 10739 (December 1914), Kinshasa; 10737–38 (July 1909), Leopoldville; 10746–48, Lower Congo; 10740–43 (August 1915), St. Antonio (Angola); 10723–25 (June 1915), 10726–36 (July 1915), Zambi. These localities are all in the Lower Congo, outside the forest proper.

They agree in every respect with the type and with the description of *nigrolineatus*, with the exception noted below. The preponderance of *nigrolineatus* characters in this region (Gaboon-Angola) seems sufficient to warrant the retention of Hallowell's name for a subspecies. The geographic relations with *flavigularis flavigularis*, however, are far from clear. The area in which the two forms intergrade is very large and, in addition, there are probably sporadic specimens of *flavigularis flavigularis* which appear to be *nigrolineatus*. With considerable hesitation, the writer inclines to a geographic definition of *nigrolineatus*, confining it to West Africa, probably north of German Southwest Africa, and with an undefined eastern boundary in Central Africa. All of the East and South African "*nigrolineatus*" are thus referred to *flavigularis flavigularis*. This geographic division emphasizes the number of longitudinal dorsal scale rows as a character for the separation of the subspecies. Only three of the twenty-nine specimens from East Africa examined by Nieden (1913, p. 80) have over twenty-four scale rows, while this figure is reached as a minimum by only three of the present twenty-six specimens from the Lower Congo. The fact that this character is not mentioned by Boulenger (1910, p. 480) in his attempt to distinguish a South African *nigrolineatus* may be a further indication of the value of this character for the restricted *nigrolineatus* in the present sense.

In one specimen of the present series, No. 10745, the frontonasal and the frontal form a short suture, and in a second they are rather narrowly separated by the prefrontals. The suture between the prefrontals varies considerably in length in the remaining specimens. A number of minor variations in head scalation may be noted. One specimen has a median occipital between the parietals. Six have one or more small plates between the frontal and the frontoparietals; in one specimen the frontoparietals and the interparietal are fused into a single plate, with indications of the normal sutures. In this specimen a supraloreal is cut off on each side from the frontonasal.

Stomach contents, examined in four specimens, consisted of parasitic worms, a small spider, and remains of grasshoppers, beetles and ants.

Summary of Measurements and Scale Characters

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGE
Length	♂	5	300–339	315.7 mm.
	♀	9	169–429	265.5 mm.
Body	♂	12	85–138	110.8 mm.
	♀	14	59–131	87.8 mm.
Tail	♂	5	212–240	219.2 mm.
	♀	9	118–298	186.7 mm.
Tail/Length	♂	5	.70–.71	.704
	♀	9	.69–.72	.703
Axilla to Groin	♂	12	47–78	62.6 mm.
	♀	14	27–78	49.8 mm.
Arm	♂	12	24–38	29.7 mm.
	♀	14	17–34	24.8 mm.
Leg	♂	12	43–62	52.8 mm.
	♀	14	31–61	44.7 mm.
Head Length	♂	12	20.5–31	25.2 mm.
	♀	14	14.0–28	20.1 mm.
Head Breadth	♂	12	12–20	16.1 mm.
	♀	14	8–17	12.1 mm.
Dorsals, Longitudinally	♂	12	24–28	26.3
	♀	14	24–26	25.7
Ventrals from Anus to Gulars	♂	12	50–54	52.0
	♀	14	49–55	51.6
Femoral pores (total number)	♂	12	32–42	34.6
	♀	14	30–40	35.2

SCINCIDÆ

See page 568 for artificial key to the species occurring in the Rain Forest.

Mabuya Fitzinger

Mabuya maculilabris (Gray)

Map 17

Euprepis maculilabris GRAY, 1845, Cat. Lizards, p. 114. MÜLLER, F., 1882, Verh. Nat. Ges. Basel, VII, p. 159.

Mabuia maculilabris BOULENGER, 1887, Cat. Lizards, III, p. 164, Pl. IX, fig. 2.

Boettger, 1888, Ber. Senck. Ges., p. 26. Günther, 1894, Proc. Zool. Soc. London, p. 87. Bocage, 1895, Herpétol. Angola, p. 40, Pl. iv. fig. 1. Boulenger, 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 277. Sjöstedt, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 12. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 42; 1900, Zool. Jahrb. (Syst.), XIII, p. 595; 1901, Beiheft, Arch. Naturg., LXVII, p. 81. Boulenger, 1902, in Johnston, Uganda Protectorate, p. 446. Tornier, 1902, Zool. Jahrb. (Syst.), XV, pp. 583, 675. Werner, 1902, Verh. Zool.-Bot. Ges. Wien., LII, p. 342. Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 205. Johnston, 1906, Liberia, II, p. 833. Werner, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI, part 1, p. 1847, Pl. i, fig. 1. Boulenger, 1908, Ann. Mus. Stor. Nat. Genova, (3) IV, pp. 5, 302; 1909, Trans. Zool. Soc. London, XIX, p. 342. Peracca, 1909, in Il Ruwenzori, I, p. 168. Müller, 1910, Abh. Bayerischen. Akad. Wiss., 2 Kl., XXIV, p. 96. Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 442; 1910, Arch. Naturg., LXXVI, part 1, p. 237. Roux, 1910, Rev. Suisse Zool., XVIII, p. 96. Boulenger, 1911, Ann. Mus. Stor. Nat. Genova, (3) V, p. 163. Sternfeld, 1912, Sitzber. Ges. Naturf. Freunde Berlin, p. 386; 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 225. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 84.

Mabuia maculilabris major Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 232. Nieden, 1912, Mitt. Zool. Mus. Berlin, VII, p. 84.

Mabuia maculilabris bergeri Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 235.

Euprepes anchietæ Bocage, 1866, Jorn. Sci. Lisboa, I, p. 62.

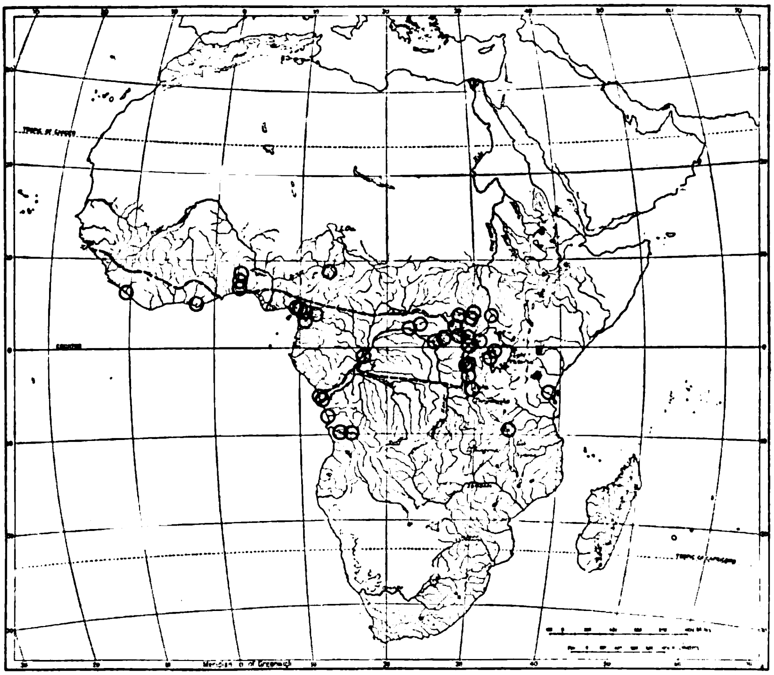
Euprepes notabilis Peters, 1879, Sitzber. Ges. Naturf. Freunde Berlin, p. 36. Bocage, 1886, Jorn. Sci. Lisboa, XI, p. 4.

Sternfeld (1912, p. 232 *et seq.*) has differentiated two supposedly distinct subspecies, *major* and *bergeri*, respectively from the Central African lake region and the Sudan, whose status will be discussed below.

One hundred and forty-three specimens of this species were taken as follows: A. M. N. H. No. 10777 (October 1909) is from Avakubi; 10767–76 (September 1909), Batama; 10890, Belgian Congo; 10750 (July 1909), Bumba; 10816 (February 1911), 10817–18 (April 1911), 10819–20, 10838–39 (September 1912), 10840–46 (October 1912), 10847 (January 1913), Faradje; 10837 (June 1912), Garamba; 10749 (July 1909), 10888 (May 1915), Lukolela; 10778–93 (April-May 1910), 10794–96 (June 1910), 10850 (March 1913), 10851–60 (June 1914), 10861–62 (July 1914), Medje; 10849 (July 1913), Nala; 10797–815 (November 1910), 10848 (April 1913), Niangara: 10751–66 (August 1909), 10863 (December 1914), 10864–71 (January 1915), 10872–87 (April 1915), Stanleyville; 10836 (April 1912), Vankerckhovenville; 10821–35 (November 1911), Yakuluku; 10889 (July 1915), Zambi.

Mabuya maculilabris is one of the species which have been able to meet the conditions of both forest and open country. Its range extends both north and south of the Rain Forest, and it occurs somewhat more rarely eastward to the coast of German East Africa.

By far the most useful systematic discussion of variation in African Scincidæ that has appeared in recent years is that of Lorenz Müller (1910, p. 560 *et seq.*). The theoretical considerations advanced for the delimitation of species are sound and the conclusions reached definitive. The writer here expresses his appreciation of a paper which has in several respects served as a model in the study of the present material. With minor exceptions, the evidence of the Central African material is in accord with that of Müller, handicapped though he was by relatively small series of specimens.



Map 17. Distribution of *Mabuya maculilabris*. Closely approximating the Western Forest Province of the Botanical map, and probably essentially a forest species.

The maximum length in the present series is reached in a male of 270 mm., body 90 mm.; the maximum body length is 95 mm., also in a male. The largest female measures 233 mm., body 82 mm., with a maximum body length in this sex of 89 mm. The tail length varies from .61 to .69 of the total. These measurements exceed those of Boulenger (1887, p. 165) and

Müller (1910, p. 568) for West African specimens, and even those of Sternfeld (1912, p. 231) for a series from the Central African lake region. Since Sternfeld bases his subspecies *major* chiefly on its larger size, it is interesting to note that the present series does not contain so large a proportion of specimens exceeding the West African specimens in this respect; and it must be noted that no series comparable to the present have been studied from West Africa, and, finally, that Bocage's type of *M. anchietæ* measured 85 mm. in body length.

The prefrontals form a suture in fifty-five specimens, are separated by a suture of the frontal and frontonasal in sixty-three, and meet in a point in twenty-one. This character appeared to Sternfeld (*loc. cit.*) as correlated with geographic variation, especially in his *Mabuya maculilabris bergeri* from the Sudan (Dufile). To test this assumption the present series may be divided into two groups, from the rain forest and bush-veldt respectively:

Prefrontals	*Ituri Forest*	*Sudan*
Forming a suture	40 specimens	15 specimens
Meeting in a point	16	5
Separate	30	33

It will be observed that the separation of the prefrontals does predominate in the Sudan; but the proportions are such as to make a specific or subspecific distinction on this basis inconclusive.

Similarly, since *bergeri* is said to have only five keels on its dorsal scales while *major* is distinguished from the West African *forma typica* in having a greater number, the variation in the present series in this respect may be geographically presented:

Keels of Dorsal Scales	*Ituri Forest*	*Sudan*
3–5	1 specimen	1 specimen
5–6	47	27
7–8	32	22
9	3	1

Since this character supplies even less basis for differentiation, *Mabuya maculilabris* does not seem at present divisible into subspecies. Either it has reached its present range too recently to be influenced by the environmental differences or these differences have recently been superimposed on a long established range.

The supranasals form a suture in forty-nine specimens, are separate in seventy, and meet at a point in nineteen. The supraciliaries are typically 5; 3–4 in one specimen, 4–4 in two, 4–5 in ten, 5–5 in one hundred and one, 5–6 in nineteen, 6–6 in four.

Müller's distinction of this species from *Mabuya raddoni* on the basis of the length of the snout appears somewhat less secure in the present series. Out of sixty specimens the distance from snout to frontal equals or exceeds the length of the frontal in forty-one cases, and is shorter in nineteen.

The scale rows about the body vary from twenty-nine to thirty-five. The scale count from anus to chin shields lies between fifty-one and sixty-six. The lamellæ beneath the fourth toe vary from fifteen to twenty.

Highly variable in coloration, the main features are nevertheless fairly constant, summed up as the presence of a dark lateral band with scattered yellow scales, the upper labials invariably spotted with yellow, which often continues as a line through the ear to the axilla.

Mr. Chapin's description of No. 10819 in life may be quoted.

> Crown and back dark olive, with inconspicuous black spots. Iris grayish buff, black posteriorly. Rim of eyelids yellow, cheeks brownish black with a few yellowish spots, and an irregular creamy line, tinged with red, from the subocular to the ear. Tiny scales around the ear tinged with orange. Sides of neck and body dark olive shading to dirty orange-red, and spotted with yellowish white scales. Throat and belly orange in middle, shading to orange-red below. Hind limbs olive above, orange below. Tail olive above, with black spots, and a few whitish spots near its base, beneath whitish, finely speckled with dull red.

The venter varies from greenish white through lemon-yellow to orange-red. The back from light olive to dark brown, with or without dark spots in irregular longitudinal lines. The number of yellow spots (usually single scales) is very variable, as is also the extent of this spotting caudally and dorsally; they are faint in the young. Usually the males are spotted more profusely and further back than the females.

An examination of the ovaries gave the following results. April and May: No. 10786, many minute eggs; No. 10885, undeveloped eggs, about 1 mm.; No. 10884, seven eggs, about 7 mm.; and No. 10874, eight eggs, 8 × 14 mm. September and October: No. 10771, eggs undeveloped, about 2 mm.; No. 10838, 4 + 3 eggs, about 5 mm.; No. 10841, 5 + 3 eggs, 8 × 14 mm. November: No. 10799, 4 + 3 eggs, 5 × 7 mm.; No. 10813, 3 + 3 eggs, 7.5 × 12 mm.; No. 10824, six eggs, 7 × 12 mm.

The various stages of development observed at the same date support Sternfeld's conclusion (*loc. cit.*) that this species does not have a definite season for reproduction.

A deposit of seven eggs was found under a log, Aug. 29, 1909, at Stanleyville. An embryo is readily identified with this species, showing the dark sides with faint light spots anteriorly. Its scales are three-keeled; the evidence appears conclusive that the number of keels in this and other species increases with age (Tornier, 1901, p. 81).

Stomachs contained remains of small snails (No. 10824), spiders (Nos. 10813 and 10841), some orthopterous insect (No. 10770), cockroaches (Nos. 10771, 10838, and 10884), termites (Nos. 10813 and 10841), beetles (Nos. 10776 and 10872), and Muscidæ ? (Nos. 10776 and 10872).

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	30	124–270	219.7 mm.
	♀	21	171–233	214.0 mm.
	Juv.	5	83–154	129.4 mm.
Body	♂	68	59–95	76.6 mm.
	♀	61	57–89	76.4 mm.
	Juv.	7	31–52	44.3 mm.
Tail	♂	30	112–180	145.5 mm.
	♀	21	114–157	142.0 mm.
	Juv.	5	52–104	85.4 mm.
Tail/Length	♂	30	.62–.69	.66
	♀	21	.61–.69	.66
	Juv.	5	.63–.67	.65
Axilla to Groin	♂	65	33–53	42.7 mm.
	♀	60	31–54	44.5 mm.
	Juv.	7	17–29	24.3 mm.
Arm	♂	65	18–30	24.2 mm.
	♀	60	18–27	23.1 mm.
	Juv.	7	10–17	14.0 mm.
Leg	♂	65	25–40	31.8 mm.
	♀	60	24–39	31.6 mm.
	Juv.	7	14–24	19.6 mm.
Head Length	♂	65	13.0–21.0	16.1 mm.
	♀	60	13.2–18.5	16.2 mm.
	Juv.	7	8.0–12.0	10.6 mm.
Head Breadth	♂	65	9.0–15.0	10.7 mm.
	♀	60	8.6–13.0	10.2 mm.
	Juv.	7	5.0– 8.0	6.8 mm.
Scales about Body	♂	68	29–35	32.6
	♀	61	30–35	32.3
	Juv.	6	32–34	32.7

"This lizard is one of the forms common in the forest region and savannah and as numerous about the houses of Europeans as in native huts. Although excellent climbers, they are not typical of the virgin forest, preferring human settlements, and may be seen sporting about or basking on trees and oil-palms, from which, in case of danger, they readily jump from any height without injury. We saw one alight on a brick floor after leaping from a twenty-four foot wall and race off quite unhurt. They are often transported in porters' loads, into which they creep at nightfall, remaining there until the bundles are dropped again on the road" [H. L.].

Mabuya polytropis Boulenger

Plate XXIV, Figure 1

Mabuya polytropis Boulenger, 1903, Ann. Mag. Nat. Hist., (7) XII, p. 433; 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 206. Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 576.

This large *Mabuya*, hitherto known only from Kamerun, Gaboon, and Fernando Po, is well represented in the collection from the Ituri Forest. *Mabuya boulengeri* Sternfeld in East Africa appears to be a closely related species, distinguished by having only four supraciliaries; but as only two specimens are known, future study may unite it with *M. polytropis*.

A list of specimens follows: A. M. N. H. No. 10891 (September 1909) is from Bafwamoko, between Bafwasende and Bafwaboli; 10892–93 (January 1910), 10894 (April 1914), 10895–902 (June 1914), 10903 (July 1914), 10904 (June 1914), 10906, Medje; 10905 (April 1914), Penge.

The chief characters of scutellation which distinguish this species from the closely allied *Mabuya maculilabris* and *raddoni* are the great number of keels on the dorsal scales of the adult and the large number of supraciliaries.

The maximum size is reached by a female 343 mm. in length, with a body length of 114 mm. The largest male measures 323 mm., with a body length of 100 mm. The tail is about twice as long as the body, .65 to .69 of the total length.

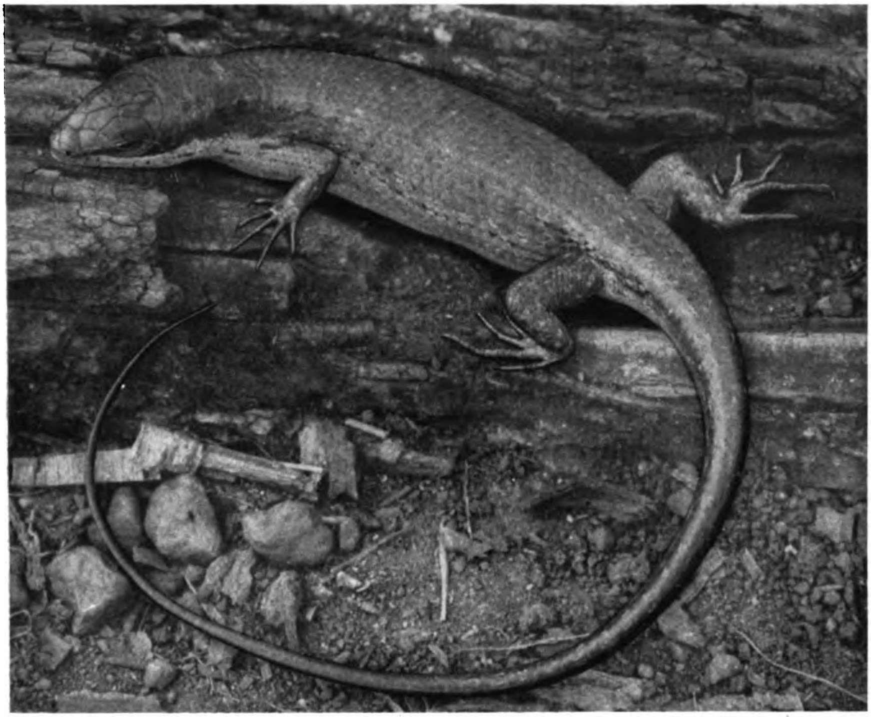
The prefrontals form a suture in all except one specimen. The supranasals are separate in three, meet in a point in five, and form a suture in eight specimens. The anterior loreal forms a suture with the first labial in all but two specimens, and in these touches it at a point. The supraciliaries number 5–6 in one specimen, 6–6 in one, 6–7 in five, 7–7 in eight, and 7–8 in one. Nuchals are present or absent, more or less developed in ten of the sixteen.

The scale rows about the body number from thirty to thirty-four; the ventrals from chin to anus fifty-three to sixty-one. The lamellæ beneath the fourth toe vary from seventeen to twenty-one. The keels of the dorsal scales vary from three (in very young specimens) to twelve to fifteen, usu-

Plate XXIV

Figure 1. *Mabuya polytropis* Boulenger. A. M. N. H. No. 10895; ♀; length 321 mm.

Figure 2. *Feylinia currori* Gray. A. M. N. H. No. 11294; length 340 mm.



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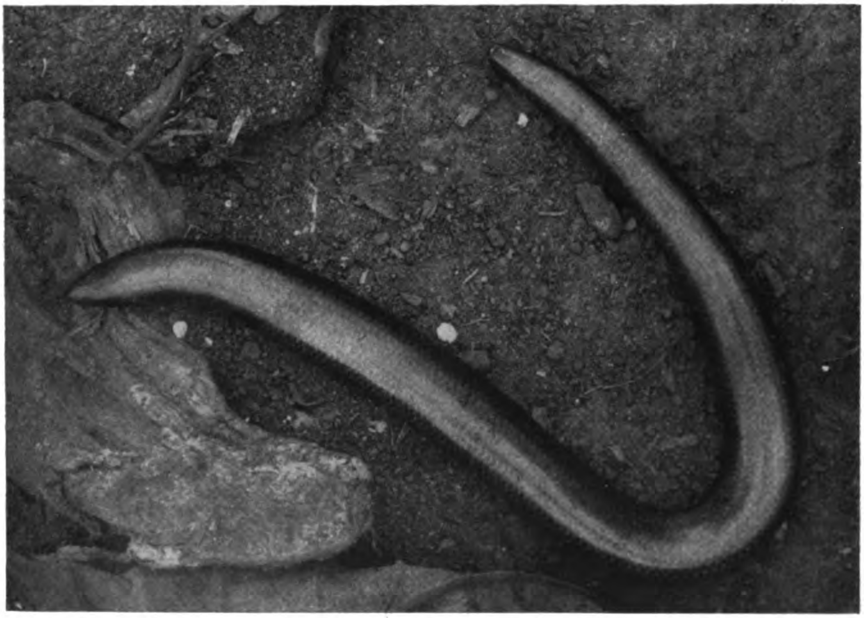

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ally exceeding ten in adults. Three of these keels may be termed the original ones, readily distinguished by their regular development and spacing, the supernumerary keels being usually shorter and irregularly distributed. In the maximum count observed, there are four keels on each side of the original three and two in each interspace.

The coloration of most of the specimens is obscure, but the characteristic transverse wavy dark marks are evident in all of the juvenile specimens, which, although they have only three to five keeled scales, are readily distinguished from the young of *Mabuya raddoni* by the absence of the lateral light line.

The coloration in life, from the field notes (♀, No. 10895), is

greenish brown above with many wavelike transverse black markings. A few pale yellowish single scales more numerous on the base of the tail. Crown light brown, iris dark, eyelids with pale yellow edge. From before the eye to back of tympanum is black mark bordered below by a pale greenish area about the lips. Venter bright bluish green, on the sides yellowish green, throat and chin also more yellowish.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	2	300–323	311.5 mm.
	♀	5	272–343	309.6 mm.
Body	♂	5	95–112	103.2 mm.
	♀	8	93–114	104.8 mm.
Tail	♂	2	205–223	214. mm.
	♀	5	179–229	203.6 mm.
Tail/Length	♂	2	.68–.69	.685
	♀	5	.65–.67	.66
Axilla to Groin	♂	5	56–65	58.8 mm.
	♀	8	55–70	61.6 mm.
Arm	♂	5	31–34	32.4 mm.
	♀	8	30–34	32.4 mm.
Leg	♂	5	42–47	44.6 mm.
	♀	8	40–49	44.9 mm.
Head Length	♂	5	20.5–24	22.5 mm.
	♀	8	20–23	21.8 mm.
Head Breadth	♂	5	14–17	15.9 mm.
	♀	8	14–16	15.0 mm.
Scales about Body	♂	5	30–32	31.5
	♀	9	30–34	31.9

"Rather common near the villages. Its food shows a greater variety than that of most other skinks examined: grasshoppers, crickets, various beetles, large ants, snails, and the egg-cases of spiders were found in the stomachs" [H. L.].

Mabuya raddoni (Gray)

Euprepis raddoni GRAY, 1845, Cat. Lizards, p. 112.
Mabuia raddonii BOULENGER, 1887, Cat. Lizards, III, p. 165, Pl. x, fig. 1. BOETTGER, 1887, Ber. Senck. Ges., p. 56; 1888, p. 27. BOCAGE, 1895, Herpétol. Angola, p. 40. GÜNTHER, 1896, Ann. Mag. Nat. Hist., (6) XVII, p. 265. SJÖSTEDT, 1897, Bihang Svensk. Akad. Handl., XXIII, part 4, No. 2, p. 14. WERNER, 1899, Verh. Zool.-Bot. Ges. Wien, XLIX, p. 133. BOULENGER, 1900, Proc. Zool. Soc. London, p. 449; 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 205. JOHNSTON, 1906, Liberia, II, p. 833. ANDERSON, 1908, Jahrb. Nassau. Ver. Naturk., LXI, p. 304. MÜLLER, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 568. KLAPTOCZ, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 282.
Euprepis blandingii HALLOWELL, 1845, Proc. Acad. Nat. Sci. Phila., p. 58; 1857, p. 50; 1857, Trans. American Philos. Soc., (2) XI, p. 76. DUMÉRIL, 1858, Arch. Mus. Hist. Nat. Paris, X, p. 178, Pl. xv, fig. 2. BOCAGE, 1872, Jorn. Sci. Lisboa, IV, p. 80.
Euprepes (Euprepis) blandingi PETERS, 1876, Monatsber. Akad. Wiss. Berlin, p. 118; 1877, p. 614.
Euprepes frenatus HALLOWELL, 1857, Proc. Acad. Nat. Sci. Phila., p. 50.
Euprepes albilabris HALLOWELL, 1857, Proc. Acad. Nat. Sci. Phila., p. 51.
Euprepes (Euprepis) æneofuscus PETERS, 1864, Monatsber. Akad. Wiss. Berlin, p. 52; 1867, p. 21.
Euprepes gracilis BOCAGE, 1872, Jorn. Sci. Lisboa, IV, p. 77.
Euprepes (Euprepis) perrotetii PETERS, 1877, Monatsber. Akad. Wiss. Berlin, p. 614, 620.
Euprepes (Euprepes) pantænii FISCHER, 1885, Jahrb. Hamburg. Wiss. Anst., II, p. 88, Pl. III, fig. 3.
Euprepes cupreus FISCHER, 1885, Jahrb. Hamburg. Wiss. Anst., II, p. 88, Pl. III, fig. 2.
Mabuia perrotetii (*part*) BOCAGE, 1895, Herpétol. Angola, p. 39. TORNIER, 1901, Beiheft, Arch. Naturg., LXVII, p. 82; 1902, Zool. Jahrb. (Syst.), XV, p. 675. WERNER, 1902, Verh. Zool.-Bot. Ges. Wien, LII, p. 342.
Mabuia benitensis BOULENGER, 1901, Ann. Mag. Nat. Hist., (7) VIII, p. 15.

Müller (1910, p. 568) has presented a very careful discussion of the relations between this species and the two preceding, and the confusion with *Mabuya perrotetii*, which begins with Peters (1877, p. 614), may be considered at an end. Like *maculilabris*, this species ranges both north and south of the Rain Forest. It has not been recorded in any of the numerous recent collections from the Central African lake region. As in the present collection it is recorded only from Niangara outside the forest (leaving out of consideration the Lower Congo records), it appears to be more characteristically a forest form in this eastward extension of its range.

The nineteen specimens were collected as follows: A. M. N. H. No. 10907 (April 1910) is from Avakubi; 10908 (September 1910), 10910–15 (June 1914), 10916–18 (July 1914), Medje; 10909 (November 1910), Niangara; 10919–20 (April 1915), Stanleyville; 10921–25 (June 1915), Zambi.

The maximum length observed in the present series is 223 mm. (both sexes), the maximum body length 80 mm., closely in accord with Müller's measurements for Kamerun specimens (*loc. cit.*). The tail length varies from .63 to .71 of the total. One specimen (No. 10921) is much more slender than is normal for the species, but agrees otherwise in every character.

The snout length from tip of nose to frontal is less than the length of the frontal in fourteen specimens, equalling or exceeding it in six (see above under *M. maculilabris*).

The prefrontals are separate in nine specimens and form a suture in eleven. The supranasals are narrowly separate in eighteen specimens, and meet at a point in the remaining two. Three specimens lack the nuchals, which may be somewhat unsymmetrically developed. The supraciliaries are 5–6 in one specimen, 5–7 in one, 6–6 in one, 6–7 in five, 6–8 in one, 7–7 in seven, 7–8 in four and 8–8 in one.

The scale rows vary from twenty-eight to thirty-four. In this character the five specimens from Zambi differ slightly from their Upper Congo relatives, three having twenty-eight scale rows and two thirty, while in the latter series the minimum is thirty. The ventrals from chin to anus number forty-nine to sixty-two. The scales are three-keeled in fourteen specimens, three- to five-keeled in five, and 3–6 keeled in one.

The coloration is the normal one for the species, which has been carefully described by Boettger, Boulenger, Müller, and others. The most useful recognition character, the white lateral line from eye to insertion of hind limb, is present in every specimen save one from Zambi, in which it is indistinct.

It will be observed that the disposition of the prefrontals is so variable as to cast renewed doubt on the distinctness of Hallowell's *Euprepes albilabris*, revived by Boulenger (1905, Mem. Soc. Esp. Hist. Nat., p. 185). There is no *Mabuya* in the collection of the Academy of Sciences of Philadelphia labeled *albilabris;* and in a form so widespread and of so great variability as *raddoni* there seems little probability of a so closely allied form being distinguishable.

The field notes afford no specific ecological information, but the species appears to be closely associated in habitat with the two preceding and to be to a similar extent arboreal. Sjöstedt (1897, p. 15) has given an interesting account of its feeding upon army ants. The stomachs of several contained grasshoppers, roaches, and large crickets swallowed whole; beetles and catetpillars also could be identified, all probably taken on or near the ground. The digestive tracts examined were infested with tapeworms.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	3	181–223	203.3 mm.
	♀	6	142–232	178.3 mm.
Body	♂	6	65–80	72.0 mm.
	♀	11	48–80	63.1 mm.
Tail	♂	3	121–154	135.0 mm.
	♀	6	94–152	117.1 mm.
Tail/Length	♂	3	.63–.69	.66
	♀	6	.63–.67	.65
Axilla to Groin	♂	6	34–45	39.5 mm.
	♀	11	28–45	35.0 mm.
Arm	♂	6	22–28	24.5 mm.
	♀	11	17–28	21.9 mm.
Leg	♂	6	30–40	34.6 mm.
	♀	11	24–36	30.3 mm.
Head Length	♂	6	14–18	16.1 mm.
	♀	11	13–17	14.1 mm.
Head Breadth	♂	6	9.6–12.0	10.6 mm.
	♀	11	8.0–11.5	9.2 mm.
Scales about Body	♂	6	30	30
	♀	11	28–34	30.2

Mabuya sudanensis, new species

Plate XXV

Eleven specimens from localities in the Sudan appear to be closely allied to the very imperfectly described *Mabuya affinis* (Gray) (1838, Ann. Nat. Hist., II, p. 289) which has been reported from Togo by Matschie (1890, Zool. Jahrb., Syst., V, p. 612). The appearance of a Togo form in the

Uele region is made probable by the analogous distribution of other Sudanese lizards, and, while the present specimens are provisionally distinguished, the real status of the species can only be cleared up by the collection of further specimens from the Togo-Niger region.

A. M. N. H. No. 10927 (November 1911) is from Faradje; 10928–29 (May 1912), 10930–34 (June 1912), Garamba; 10935 (June 1912), South of Garamba River; 10936, Uele region; 10926 (November 1911), Yakuluku.

Diagnostic Characters

Habitus lacertiform, with an extremely long tail, three to four times the length of the body, slender trunk, and well developed limbs. Lower eyelid with an undivided transparent disc. Scales on soles not spinose. Subocular not narrowed inferiorly. Head shields normal. A postnasal. Dorsal scales tricarinate. Subdigital lamellæ smooth. Twenty-six or twenty-eight scales about the body. Ear lobules short, pointed. Distinguished from *Mabuya affinis* by longer snout and shorter limbs; hind leg reaching the wrist, not reaching the elbow of the adpressed fore limb, and by the extraordinarily long tail.

Detailed Description

Type: A. M. N. H., No. 10934, ♀.

Body slender, neck not constricted. Snout pointed, the distance from its tip to the frontal equalling the length of the frontal. Toes of the fore limb nearly reaching snout. Toes of hind limb reaching between wrist and elbow of fore limb. Tail-length, .78 of the total.

Nostril behind the rostro-labial suture. A postnasal present. Anterior loreal in contact with the first labial. Supranasals separated by a rostro-frontonasal suture. Frontonasal nearly as long as broad, separated from the frontal. Four supraoculars, second largest, second and third in contact with the frontal, parietals separated by the interparietal. Nuchals present. Supraciliaries 5–5. Subocular preceded by four upper labials, about equal to three in length. Lower eyelid with an undivided transparent disc, larger than the pupil, smaller than the ear opening. Ear opening oval, provided with two short pointed lobules in front.

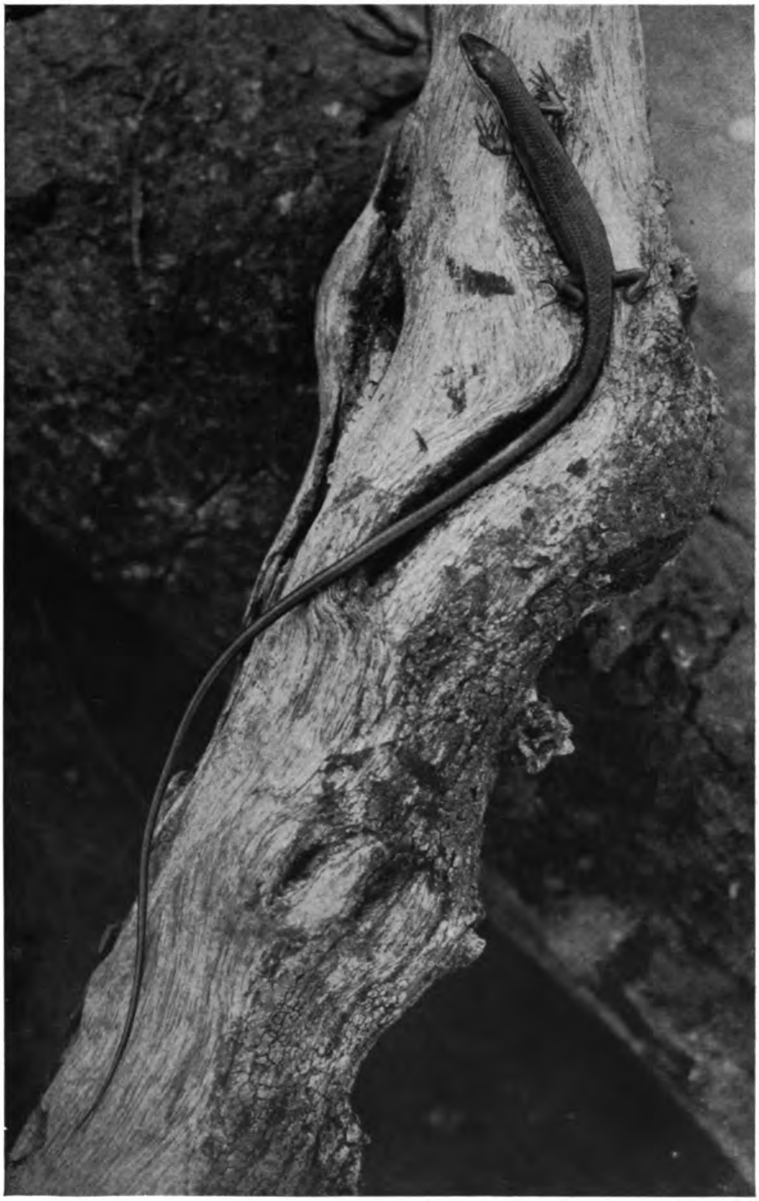
Dorsal scales sharply tricarinate, the middle keel shorter than the laterals. Twenty-six scales about the body, of which fourteen are keeled. Fifty-seven scales from anus to chin shields. Fourteen smooth lamellæ beneath the fourth toe.

The dorsum is light brown, darker on the crown. Irregular black markings beginning at the shoulder region, are arranged in four indefinite longitudinal rows on the six median dorsal scale rows. The two middle rows of black extend on the base of the tail. A well-marked white line extends from the subocular to the ear, bordered above by black. The venter (all of the smooth scales) is pearly gray with a tinge of yellow, bluish beneath the tail.

The paratypes present considerable variation. The tail-length varies from .70 to .80 of the total, averaging .76. The anterior loreal is separated from the first labial in five specimens; in contact on one side, separated on the other, in one. The supranasals are in contact in two specimens. The

PLATE XXV

Mabuya sudanensis, new species. A. M. N. H. No. 10934, type; ♀; length 264 mm.



parietals may form a short suture behind the interparietal. The nuchals are absent in one specimen. The supraciliaries are 5–5 in seven specimens, 5–6 in two, and 6–7 in two. The scale rows are twenty-six in ten specimens, twenty-eight in one.

The coloration of the smaller specimens is somewhat different and rather variable. In No. 10936 there are anteriorly five black lines on the edges of the six median scale rows, the middle one dropping out at the arms, leaving four continuous lines to a point above the hind limbs, where the lateral pair drops out, the two remaining lines continuing on the base of the tail. These lines nearly equal in width the brown interspaces; some of the lateral scale rows are narrowly dark edged. The white line from subocular to ear continues over the insertion of the arm to the hind limb, on the seventh and eighth scale rows from the vertebral line. It is bordered above (on the upper half of the seventh scale row) by a black line, below by dots of black on the separate scales. Between this coloration in the smallest specimen and that of the largest, the remaining specimens show varying intermediate phases. All show the lateral white line well past the arm, but it does not reach the groin. The black lines are broken up and the resulting spots more or less widened.

In essential points this coloration agrees with Matschie's description (1892, Zool. Jahrb., Syst., V, p. 612) of the unique Togo specimen of *Mabuya affinis*. It differs from that of *Mabuya wingatii* Werner (1907, Sitzber. Akad. Wiss. Wien, math.-natur., CXVI, part 1, p. 1849, Pl. II, fig. 3) in lacking the upper light line of that species as well as in the absence of the lower line in the adult. It lacks the black lateral band of *Mabuya diesneri* Sternfeld (1911, Sitzber. Ges. Naturf. Freunde Berlin, p. 248).

The distinctions between the present form and *Mabuya diesneri* and *Mabuya wingatii* appear to exclude the possibility of confusion. Both of the latter are larger species, 85 to 103 mm. body length, and *wingatii* has not the extraordinarily long tail. The scales about the body in *wingatii* are 30 to 32, in *diesneri* 28 to 32. *Mabuya wingatii* has a very short frontonasal. From *Mabuya affinis* it is distinguished by having a longer snout; by the hind limb reaching between elbow and axilla; by the distinct suture of the prefrontals; and probably by the tail length, which has not been defined for either the type (with no locality) or the only other known specimens of *affinis*. It is difficult to understand the omission of *Mabuya affinis* from Tornier's list of Togoan reptiles (1901, pp. 63–88). The keeled scales distinguish it from *Mabuya megalura* in East Africa.

Measurements and Scale Characters

A. M. N. H. No.	10926	10927	10928	10929	10930	10931	10932	10933	10934	10935
Sex	♀	♂	♀	♀	♀	♀	♀	♀	♀	♂
Length	304	[260]	258	248	221	[171]	252	248	264	263 mm.
Body	78	67	56	50	51	53	55	56	58	61 mm.
Tail	226	[193]	202	198	170	[118]	197	192	206	202 mm.
Tail/Length	.74		.77	.80	.77		.78	.77	.78	.77
Axilla to Groin	46	38	32	28	29	30	33	32	34	34 mm.
Snout to Arm	25	25	20	19	18	20	20	20	20	22 mm.
Arm	21	19	18	16	16	17	18	18	18	20
Leg	25	24	23	22	21	20	22	22	22	24
Head Length	15.0	14.2	12.0	11.7	12.0	12.0	12.6	12.3	12.3	12.5 mm.
Head Breadth	9.0	9.0	7.6	7.5	7.2	7.5	7.7	7.5	7.0	7.6 mm.
Scales about Body	26	28	26	26	28	26	26	26	26	26
Scales Anus to Gulars	54	53	55	54	56	50	54	56	57	54
Lamellæ of Fourth Toe	15	15	16	14	16	16	16	15	14	15
Supraciliaries	6–7	5–5	5–6	5–5	5–6	5–5	5–5	6–7	5–5	5–5

"These agile, graceful lizards attain a foot in length and are typical of the savannah of the northeastern Belgian Congo and the adjoining Sudan (Pl. XXV). They are not attracted to the native villages, but occur nevertheless in plantations, cleared patches in the midst of brush, changed every two or three years. Though not really scarce, their light or dark brown bodies match the surroundings so well that they are hard to discover. Singly or in pairs, they bask in gnarled branches, ever on the alert; the slightest sound caused by a grasshopper or beetle alighting sends them running toward the prospective victim, which is gulped without much tearing; spiders also are taken. The termites in the thin-walled passageways so common on tree trunks and branches offer an ample repast.

"Over the densely growing branchlets of the stunted bushes they move with ease, deriving considerable assistance from the extremely long, slender tail, which, however, is not in the least prehensile. When pursued they run into hollows, and on being driven out on the branches jump into the grass from any height and usually succeed in escaping. Although chiefly arboreal, in these regions where trees or bushes are often widely scattered they may frequently be seen on the ground" [H. L.].

Mabuya perrotetii (Duméril and Bibron)

Plate XXVI; Map 18

Euprepes perrotetii Duméril and Bibron, 1839, Erpétol. Gén., V, p. 669. Gray, 1845, Cat. Lizards, p. 111. Bocage, 1866, Jorn. Sci. Lisboa, I, p. 44. Steindachner, 1870, Sitzber. Akad. Wiss. Wien (math.-natur.), LXII, part 1, p. 331. Bocage, 1872, Jorn. Sci. Lisboa, IV, p. 79. Boettger, 1881, Abh. Senck. Ges., XII, p. 103.

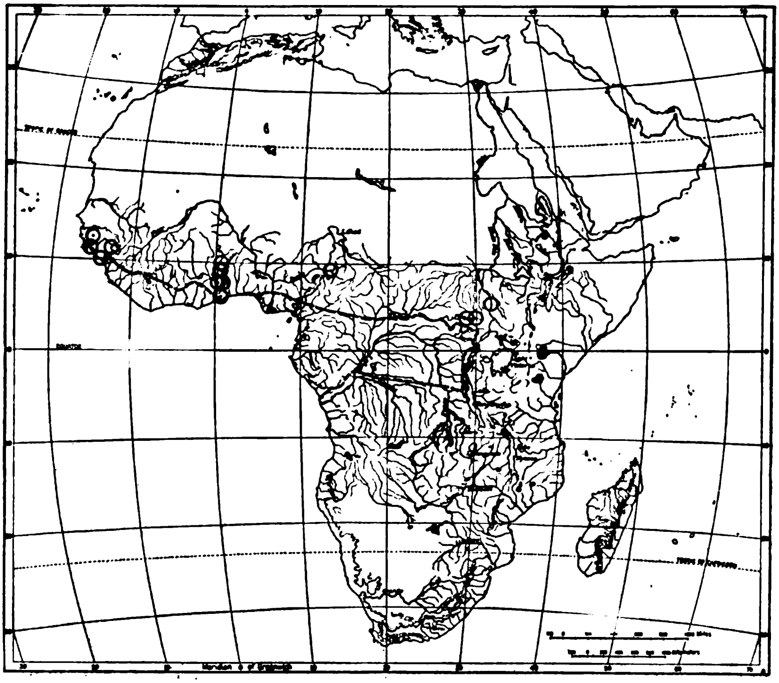
(*Euprepes Euprepis perrotetii* Peters, 1877, Monatsber. Akad. Wiss. Berlin, pp. 614, 620.)

Mabuia perrotetii Boulenger, 1887, Cat. Lizards, III, p. 168. (Bocage, 1895, Herpétol. Angola, p. 39). Tornier, 1901, Beiheft, Arch. Naturg., LXVII, p. 82. (Tornier, 1902, Zool. Jahrb. Syst., XV, p. 675). Werner, 1902, Verh. Zool.-Bot. Ges. Wien, LII, pp. 333, 336, (342). Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 206. Nieden, 1910, Arch. Naturg., LXXVI, part 1, p. 238. Klaptocz, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 283.

Euprepes (*Euprepis*) *pleurostictus* Peters, 1864, Monatsber. Akad. Wiss. Berlin, p. 52.

Euprepis inornata Gray, 1845, Cat. Lizards, p. 113.

Mabuia mongallensis Werner, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI, part 1, p. 1850, Pl. I, fig. 2.

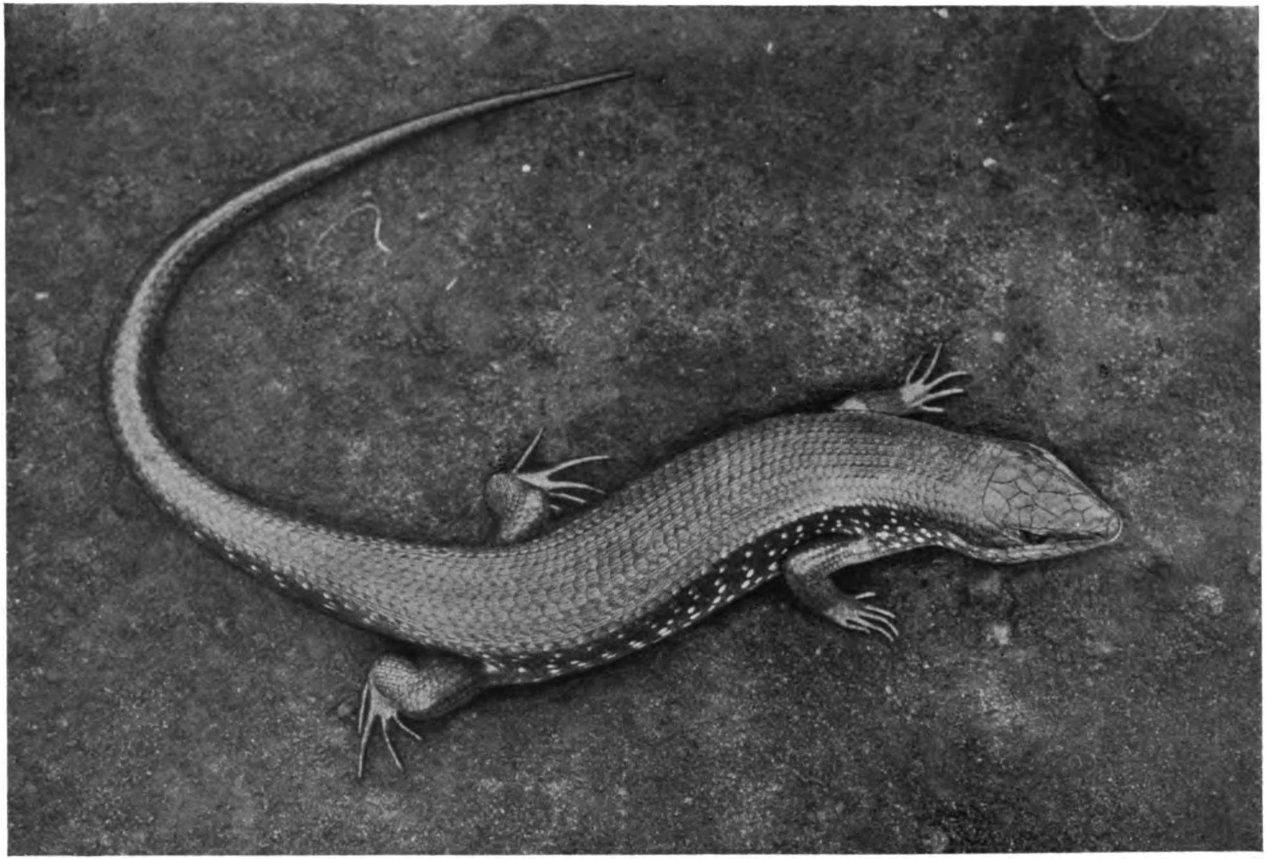


Map 18. Distribution of *Mabuya perrotetii*. Characteristic of the Sudanese Subprovince.

The references to this species which the writer believes should be transferred to *Mabuya raddoni* have been enclosed in parenthesis. The writer feels that Tornier's Togo specimens, which Boulenger (1905, Mem. Soc.

Plate XXVI

Mabuya perrotetii (Duméril and Bibron). A. M. N. H. No. 10955; ♂; **length** 248 mm.



Esp. Hist. Nat., I, p. 185) has tentatively referred to *Mabuya albilabris* Hallowell, might with at least equal probability be simply young *perrotetii*.

The species is a typically Sudanese form like *Lygodactylus gutturalis* and *Varanus exanthematicus,* ranging from the Senegambia to the Upper Nile. The twenty-seven specimens were collected as follows:

A. M. N. H. Nos. 10937–38 (February 1911), 10939 (April 1911), 10941 (November 1911), 10956–62 (October 1912), 10963 (January 1913) are from Faradje; 10942–47, 10949–52 (May 1912), 10948 (March 1912), 10953–54 (June 1912), 10955 (July 1912), Garamba; 10940 (November 1911), Yakuluku.

The eastern specimens (which may prove to be distinguishable as subspecies *mongallensis* Werner) seem to be decidedly smaller than the West African representatives. The maximum length in the present series is 310 mm. with a body length of 118 mm., compared with 418 mm. total and 163 mm. body length (even 180 mm. in a still larger specimen) recorded by Boulenger (1887, p. 169). The tail length varies from .60 to .63 of the total, being much more uniform in this respect than in most species of *Mabuya.*

The prefrontals form a suture in twenty-three of the twenty-seven specimens. In three specimens they are separated (in a fourth, partly separated) by the development of a small interprefrontal shield. In only one specimen is there a suture between frontal and frontonasal. The supranasals in every case form a suture. The frontonasal is in two cases longitudinally divided. The labials before the subocular are uniformly four. The anterior loreal is well separated from the first labial. The supraciliaries are 6–6 in twenty-six specimens, 7–7 in one. There are no distinguishable nuchals in eighteen specimens. In five there are two enlarged scales on each side behind the parietals, and in the remaining four there are normally developed nuchal scales.

The scales about the body are usually thirty-two, sometimes thirty-three or thirty-four. The ventrals from anus to chin vary from fifty-two to sixty-two. The lamellæ beneath the fourth toe vary from fifteen to eighteen. They are normally smooth, but in one specimen are distinctly keeled, in others faintly. It may be noted that keeling of the subdigitals is often counterfeited in specimens whose toes have dried out before preservation, or which have been preserved in too strong alcohol. The keels of the dorsals are obtuse, very faint on the laterals (as in various descriptions), wholly distinct in character from those of *M. raddoni* and other species of the genus in the present collection.

The coloration in life is very striking:

> Above glossy brownish gray, with scattered dark markings. A dark brown stripe from behind the eye nearly to base of hind limbs, below which is an indefinite diffused

red band (often bright orange) starting at the mandible and continued past the hindlimbs on the anterior two-thirds of the tail. Many scattered pale bluish scales on the sides. Venter bluish white, underside of tip of tail grey. [L. and C.]

In alcohol, the red coloration of the sides is rarely distinguishable, and the indistinct dorsolateral light line is more noticeable, bounding the dark line (of the field notes) above. The dark markings of the back are frequently arranged in longitudinal lines between the scale rows. Since Werner (1907, p. 1851) describes the sides of a young specimen as dark brown (presumably from life), the red coloration appears to be an adult and probably a nuptial character.

The question of the distinctness of *mongallensis* Werner from the West African *perrotetii* appears to rest almost entirely on size. None of the characters proposed in his description (absence of nuchals, keeled subdigitals, and coloration) holds good in the present series. Pending more extensive study of the West African fauna, and of the intervening region, the writer prefers to unite *mongallensis* with *perrotetii*, though ultimately a trinomial may best represent the relationships involved.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	8	168–310	258.0 mm.
	♀	9	123–283	207.5 mm.
Body	♂	15	60–123	101.1 mm.
	♀	12	47–111	81.8 mm.
Tail	♂	8	103–192	159.0 mm.
	♀	9	76–173	128.2 mm.
Tail/Length	♂	8	.60–.63	.61
	♀	9	.60–.63	.61
Axilla to Groin	♂	15	31–71	55.7 mm.
	♀	12	25–65	46.1 mm.
Arm	♂	15	17–33	28.2 mm.
	♀	12	14–30	23.7 mm.
Leg	♂	15	22–41	36.3 mm.
	♀	12	17–39	30.3 mm.
Head Length	♂	15	14.0–28.0	23.0 mm.
	♀	12	11.5–24.0	17.8 mm.
Head Breadth	♂	15	10–19	15.3 mm.
	♀	12	7–15	11.6 mm.
Scales about Body	♂	15	32–34	32.6
	♀	12	32–34	32.6

"This large skink is one of the most typical of the savannah of the northeastern Uele and is not particularly attracted by settlements. The males attain more than one foot in length; the females are slightly smaller. In these arid plains the bright coloration of this species is a source of delight to the traveler who happens to get a glimpse of one or two of these wary and swift moving lizards. The dark greenish upper side, often separated by a dark line from the broad glossy, orange-red band on the flanks marked with small white or pale yellow dots, is the pattern distinctive of adults (Plate XXVI). The young are much duller and more uniform in color. Although fairly good climbers, they are seldom seen in the low, gnarled trees so common in the savannah, but bask in open spaces, on logs, stones, and the piles of débris in dried out riverbeds. They take refuge in any suitable hole and apparently do not burrow.

"Stomach contents show that the food consists of various insects, chiefly Orthoptera, Coleoptera, and termites, which may have been taken on the ground or trees. Some very large grasshoppers had been torn to pieces; others an inch long, like some crickets, had been swallowed whole, completely filling a portion of the tubular stomach, and the same was true of beetles; of the termites, only the chitinous head was left intact by the gastric fluids" [H. L.].

Mabuya quinquetæniata (Lichtenstein)

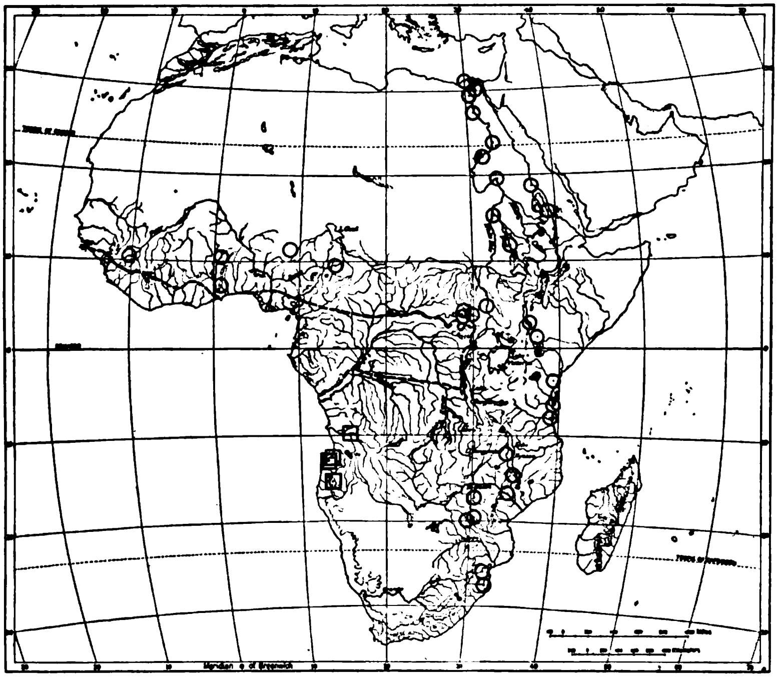
Plate XXVII, Figures 1 and 2; Map 19

Scincus quinquetæniatus Lichtenstein, 1823, Verz. Doubl. Mus. Berlin, p. 103.
Mabuya quinquetæniata Fitzinger, 1826, Neue Class. Rept., p. 52.
Mabuia quinquetæniata Boulenger, 1887, Cat. Lizards, III, p. 198. Günther, 1892, Proc. Zool. Soc. London, p. 555. Boettger, 1893, Kat. Rept. Mus. Senck., p. 100. Del Prato, 1895, Atti Soc. Italiana Sci. Nat., XXXV, p. 24. Jeude, 1895, Notes Leyden Mus., XVI, p. 228. (Anderson, 1896, Herpetol. Arabia and Egypt, p. 104.) Boulenger, 1896, Proc. Zool. Soc. London, p. 215; 1897, Ann. Mus. Stor. Nat. Genova, (2) XVII, p. 278. Werner, 1896, Jahrb. Ver. Magdeburg, p. 142. Boulenger, 1897, Proc. Zool. Soc. London, p. 800; 1897, Ann. Mus. Stor. Nat. Genova, (2) XVII, p. 278. Johnston, 1897, British Central Africa, p. 361. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 42. Anderson, 1898, Zool. Egypt, I, p. 187, Pl. xxiv, figs. 1-3. Tornier, 1900, Zool. Jahrb. (Syst.), XIII, p. 595; 1901, Beiheft, Arch. Naturg., LXVII, p. 85. Boulenger, 1902, Proc. Zool. Soc. London, II, p. 17. Werner, 1902, Verh. Zool.-Bot. Ges. Wien, LII, p. 336. Boulenger, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 111. Tornier, 1905, Zool. Jahrb. (Syst.), XXII, p. 382. Boulenger, 1907, Mem. Proc. Manchester Lit. Philos. Soc., LI, No. 12, p. 8. Werner, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI,

part 1, p. 1851. Chubb, 1909, Proc. Zool. Soc. London, p. 594. Pellegrin, 1909, Bull. Mus. Hist. Nat. Paris, XV, p. 413; 1909, Bull. Soc. Zool. France, XXXIV, p. 204. Werner, 1909, Zool. Jahrb. (Syst.), XXVII, p. 611. Boulenger, 1910, Ann. S. African Mus., V, p. 484. Hewitt, 1910, Ann. Transvaal Mus., II, pp. 94 and 99. Meek, 1910, Publ. Field Mus. Zool., VII, p. 410. Nieden, 1910, Archiv Naturg., LXXVI, part 1, p. 239. Lönnberg, 1911, Svenska Vetensk. Akad. Handl., XLVII, No. 6, p. 16. Sternfeld, 1911, Sitzber. Ges. Naturf. Freunde Berlin, p. 249; 1911, Mitt. Zool. Mus. Berlin, V, p. 417. Barbour, 1913, Proc. Biol. Soc. Wash., XXVI, p. 147. Klaptocz, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 285. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 85. Werner, 1913, in Brehm's, Tierleben, Ed. 4, V, p. 198.

Euprepes savignyii Duméril and Bibron, 1839, Erpétol. Gén., V, p. 677. Francaviglia, 1896, Boll. Soc. Romana Zool., p. 35.

For the synonymy of this series *ante* Boulenger, 1887, the reader is referred to Anderson, 1898, Zoology of Egypt, I, p. 187.



Map 19. Distribution of *Mabuya quinquetæniata*.

○ *Mabuya quinquetæniata*. The southern records probably are referable to a subspecies, *margaritifer*.
□ *Mabuya binotata*, an Angolan offshoot of *quinquetæniata*.
Mabuya quinquetæniata is a savannah species which has invaded Lower Egypt, following the Nile. (Cf. *Varanus griseus*, Map 12.)

The species is represented in the collection by 130 specimens, whose date and place of capture follow: A. M. N. H. Nos. 10964–66 (January 1910), are from Dungu; 10967–96 (February 1911), 10997–11004 (March 1911), 11005–11 (April 1911), 11012, 11021 (August 1912). 11022–32 (September 1912), 11033–91 (October 1912), 11092–94 (January 1913), Faradje; 11018–20 (May 1912), 11017, Garamba; 11013–16 (November 1911), Yakuluku.

Although Boulenger (1887, III, p. 198) has united the Angolan *Mabuya binotata* Bocage and the southeastern *margaritifer* Peters with *quinquetæniata*, the reasons urged for the distinctness of *binotata* by Bocage (1895, Herpétol. Angola, p. 47) appear to have been accepted by Boulenger in giving the range of *Mabuya quinquetæniata* for South Africa (1910, p. 484). To the writer, the higher average number of scale rows in the southern specimens seems to warrant the retention of the name *margaritifer* Peters for a southern subspecies of *quinquetæniata*. *Mabuya quinquetæniata quinquetæniata* is typically Sudanese in distribution, with a northward extension to Lower Egypt following the borders of the Nile much as aquatic species have followed the Nile itself. The record from Tripoli (Francaviglia, 1896, p. 35) has been questioned by Werner (1909, p. 611), and Werner's record from the other extreme of the range, Grahamstown, has not been confirmed by South African herpetologists. The absence of this species in the area between Mongalla, Khartoum, and Roseires noted by Werner (1907, p. 1851) is not readily explicable. The exact delimitation of the range evidently will require further records.

Variation in the Egyptian representatives of this species has been discussed by Anderson (1898, pp. 187–193). The present series, for which the data are tabulated below, is on the whole uniform. No regional variation is discoverable which would warrant a distinction from the Egyptian specimens.

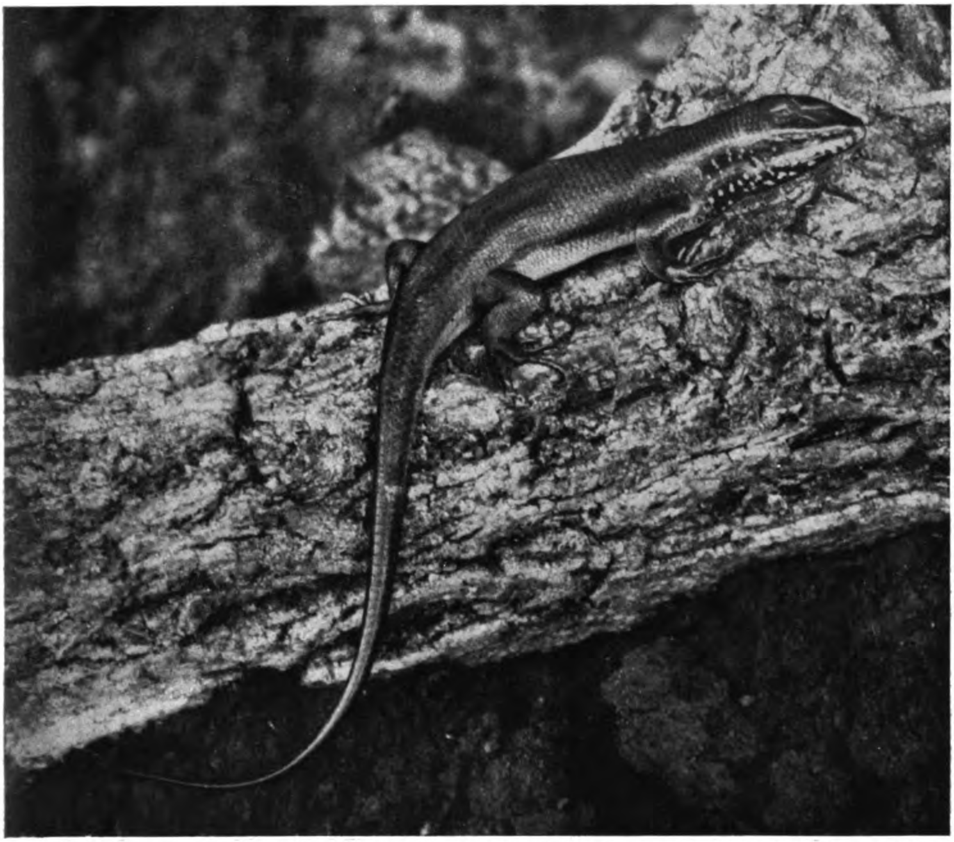
The maximum lengths in the series are 245 mm., male, and 229 mm., female. The tail length varies from .55 to .62 of the total.

The prefrontals form a more or less extensive suture in one hundred and seven specimens, meet at a point with the frontal and frontonasal in thirteen, and are separated by a suture of the latter scutes in seven. In one specimen the prefrontals and frontonasal are irregularly fused, and in another these and the frontal are similarly united. Two specimens have the frontonasal longitudinally divided. In one specimen a pair of small supernumerary supranasals is split off from the nasals. The supraciliaries are normally 6; 4–5 in one specimen, 5–5 in eight, 5–6 in sixteen, 6–6 in ninety-nine, 5–7 in one, 6–7 in two, and 7–7 in two. Labials anterior to the subocular 3–4 in one specimen, 4–4 in one hundred and twenty, 4–5 in six, and 5–5 in two. The scales about the body vary from 36 to 41; the ventrals in a

PLATE XXVII

Figure 1. *Mabuya quinquetæniata* (Lichtenstein). A. M. N. H. No. **11025**; ♂; length 233 mm.

Figure 2. *Mabuya quinquetæniata* (Lichtenstein). A. M. N. H. No. **11022**; ♀; length 220 mm.



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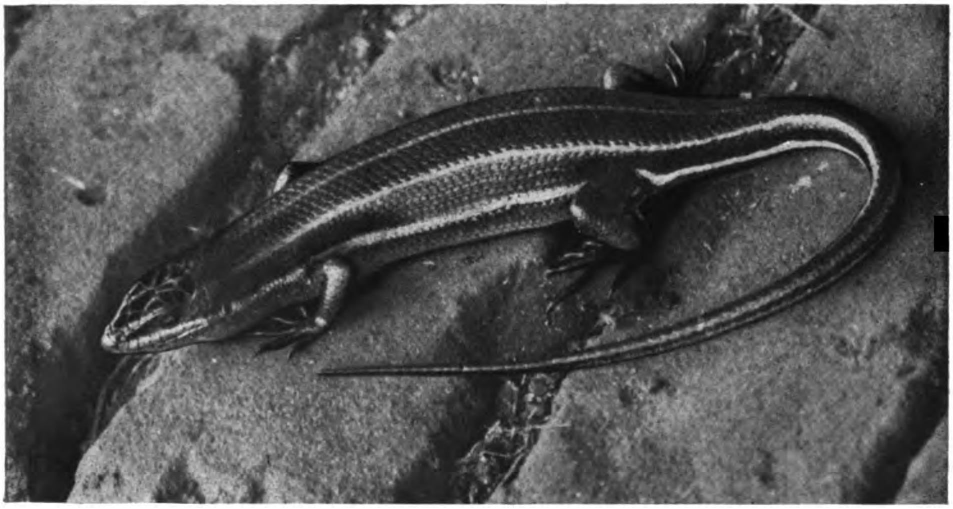

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line from anus to chin shields vary from 56 to 66. The subdigital scales on the fourth toe number from 17 to 23.

The constancy of the system of coloration in this species, once the variations for age and sex are known, reminds one strongly of the similarly consistent variation in the *Plestiodon quinquelineatus* familiar to American herpetologists. The species has been beautifully illustrated by Anderson (*loc. cit.*). In the majority of instances the adult females retain the stripes, but in occasional specimens the coloration gives no clue to the sex.

The ovaries of specimens captured in February contained eggs as follows: Nos. 10974 and 10993, many minute eggs; No. 10985, nine eggs, and No. 10975, ten eggs, all about 14 × 8 mm.; and No. 10973, eleven eggs, 14 × 8 to 15 × 8.3 mm. In September: Nos. 11027 and 11033 had undeveloped eggs (maximum, 2 mm.); No. 11030, 8 + 8 eggs, 3 to 4 mm.; No. 11029, ten eggs, about 6 × 5 mm.; and No. 11060, 8 + 8 eggs, 15 × 9 mm. Since the eggs are in such different stages of development at widely separated seasons of the year, the conclusion must be drawn that there is no such regular breeding season as there is in Lower Egypt.

The stomach contents of thirteen specimens were as follows: a small fruit and seeds and a small earthworm (No. 11031); parasitic worms (Nos. 11002 and 11088); a small spider (No. 11002); earwigs (Nos. 11076 and 11060); cockroaches (Nos. 11028, 11029, 11031); grasshoppers (Nos. 10976, 10999, 11008, and 11013); crickets (Nos. 10997, 10999, 11002, 11009, 11028, and 11030); termite workers (No. 11088); Heteroptera (Nos. 10976 and 11028); beetles (Nos. 11028, 11031, a weevil and a chrysomelid, and No. 11088 a carabid); muscid flies (Nos. 11028 and 11031); and a compacted mass of skin and scales of a scincid lizard (No. 11030).

Summary of Measurements and Scale Characters

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGE
Length	♂	22	150–245	232.6 mm.
	♀	32	155–229	200.5 mm.
	Juv.	8	108–142	121.7 mm.
Body	♂	59	60–105	99.7 mm.
	♀	59	63–102	86.6 mm.
	Juv.	9	40–56	47.6 mm.
Tail	♂	22	89–150	130.3 mm.
	♀	32	85–138	118.5 mm.
	Juv.	8	65–86	73.1 mm.
Tail/Length	♂	22	.56–.62	.591
	♀	32	.55–.62	.589
	Juv.	8	.57–.62	.595

	Sex	No. of Specimens	Extremes	Average
Axilla to Groin	♂	59	32–56	50.1 mm.
	♀	59	33–60	47.1 mm.
	Juv.	11	20–31	26.1 mm.
Arm	♂	59	19–33	28.4 mm.
	♀	58	20–36	26.1 mm.
	Juv.	11	14–20	16.0 mm.
Leg	♂	58	28–45	40.0 mm.
	♀	57	28–43	36.6 mm.
	Juv.	11	19–28	23.1 mm.
Head Length	♂	59	14.0–23.0	20.8 mm.
	♀	59	15.0–21.0	19.0 mm.
	Juv.	11	10.5–14.0	12.3 mm.
Head Breadth	♂	59	9.3–16.0	13.9 mm.
	♀	59	10.0–15.0	12.7 mm.
	Juv.	9	7.0–10.0	8.0 mm.
Scales about Body	♂	59	36–40	37.8
	♀	59	36–40	38.0

"In the Ituri Forest, lizards, excepting the Agamas, are not numerous and one seldom sees more than two or three together, but in the savannah of the northeastern Uele, where they are of more frequent occurrence, *Mabuya quinquetæniata* is the most common form observed. In all villages north of the Uele and east of Niangara dozens of them sport about during the hottest hours of the day on the cracked mud walls, the thatch of native huts, and on bridges, and oil palms. At first the traveler might believe he sees three different species, but the various color phases are soon easily recognized: the generally more numerous blue-tailed young, especially in the larger stages, resemble the brownish females, with their five yellow stripes [Plate XXVII, Fig. 2]; the blue-gray males, with black throat dotted with yellow or orange [Plate XXVII, Fig. 1], are equally conspicuous; although less well defined, transitional color patterns are numerous.

"The whitish, oblong eggs are easily located beneath logs in the outskirts of villages or on plantations. Though the well-developed condition of as many as eleven eggs in the ovaries would point to large sets, only three or five are grouped together, slightly imbedded in the soft ground and decaying pieces of bark. Beneath a twenty foot log I collected as many as forty eggs, in all stages of development, including a dozen shriveled old shells.

"This swift lizard often entangles itself in a little trap set by the children and made of tiny grass-stalks, the ends of which are fastened to the poles supporting the thatching. How to make this cage is known throughout

West Africa and has been taught to American children by their black nurses. At other times the boys stun or kill lizards by a well directed blow with a flexible rod or show great skill in shooting them with arrows" [H. L.].

Mabuya acutilabris (Peters)

Text Figures 22 and 23

Euprepes acutilabris Peters, 1862, Monatsber. Akad. Wiss. Berlin, p. 19; 1877, p. 614. Bocage, 1872, Jorn. Sci. Lisboa, IV, p. 80.

Mabuia acutilabris Boulenger, 1887, Cat. Lizards, III, p. 208. Bocage, 1895, Herpétol. Angola, p. 46. Roux, 1907, Zool. Jahrb. (Syst.), XXV, p. 434. Boulenger, 1910, Ann. S. African Mus., V, p. 486. Werner, 1910, Denkschr. Med. Naturw. Ges. Jena, XVI, p. 349, Pl. vii, fig. 9. Sternfeld, 1911, Fauna Deutschen Kolonien, Reihe 4, Heft 2, p. 40, fig. 48; 1911, Mitt. Zool. Mus. Berlin, V, p. 408.

Euprepes damaranus Steindachner, 1870, Sitzber. Akad. Wiss. Wien (math.-natur.), LXII, part 1, p. 338, Pl. iii, figs. 1–3.

There are ninety-nine specimens in the collection, as follows: A. M. N. H. No. 11098 (January 1915) is from Boma; 11097 (June 1909), Matadi; 11095–96 (June 1909), Noki (Angola); 11099–11193 (August 1915), St. Antonio (Angola).

Mabuya acutilabris ranges southward along the coast into German Southwest Africa.

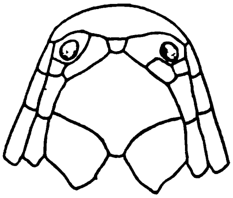


Fig. 22. Variation in the nasal region in *Mabuya acutilabris* (11142). Showing fusion of the nasal and supranasal.

This large series is remarkably uniform in most respects, with a very distinctive color pattern, more plainly marked than appears in Werner's figure (1910, Pl. viii, fig. 9). Variation is chiefly noticeable in the nasal region. In the normal disposition, the nostril is pierced directly above the rostro-labial suture in the upper posterior part of a small nasal; with a supranasal above meeting its fellow; and a small postnasal. In thirty-four of the ninety-five specimens the supranasals are separated by a median internasal, which may be minute or fairly well developed. The supranasals, moreover, are frequently divided on one or both sides, so that three scales surround the nasal; 2–1 in seventeen, 2–2 in eighteen, 2–3 in two, 3–3 in one specimen, normal (i. e., 1–1) in the remaining fifty-seven. In the case of this division of the supranasals the anterior part is frequently fused with the nasal proper. The prefrontals are normally separated, but form a short suture in four specimens. One specimen has an irregular inter-prefrontal scale. A single specimen has the interparietal imperfectly separated, fused posteriorly with the parietals, but with the sutures present anteriorly. The parietals meet behind the interparietal in all but two cases.

The ground color is grayish brown above. There is a light stripe on the suture between the two median scale rows, beginning eight or ten scales behind the occipital, as wide as a scale row. A similar lateral stripe on each side on the fourth and fifth scale rows, beginning at the corner of the parietals. The sixth and upper half of the seventh rows are darker brown, below which is another light line beginning on the subocular, passing through the ear, over the arm, and to the groin. This lower lateral stripe is defined below by gray instead of brown. The interspaces between these longitudinal lines are more or less uniformly cross-barred with darker brown, each bar about as wide as the length of a scale, and frequently with one or two light scales at its posterior edge. Ten or twelve of these transverse marks are distinguishable between the head and the base of the tail. Venter pure white. Steindachner's figure (1870, Pl. III, fig. 1) is excellent; that of Werner (1910, Pl. VIII, fig. 9) is either less successful or represents a different color phase.

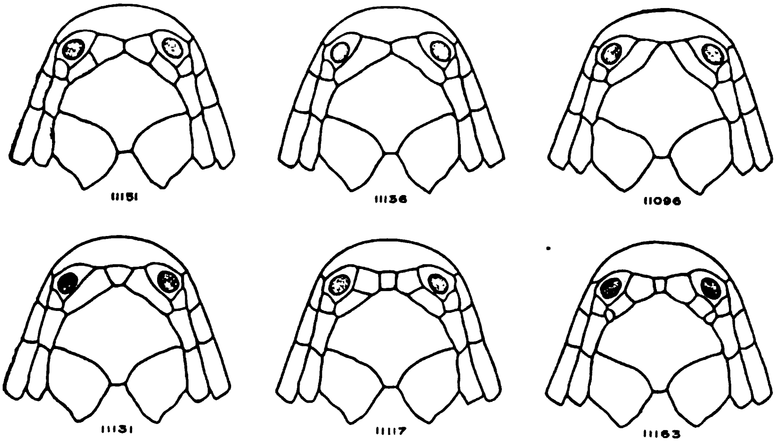


Fig. 23. Variation in the nasal region in *Mabuya acutilabris*. Serial variation in six specimens. Intermediate, asymmetric variations not illustrated.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	15	121–165	147.3 mm.
	♀	39	116–157	138.1 mm.
Body	♂	21	40–56	50.0 mm.
	♀	50	40–59	51.2 mm.

	Sex	No. of Specimens	Extremes	Average
Tail	♂	15	80–110	96.4 mm.
	♀	39	74–104	91.0 mm.
Tail/Length	♂	15	.60–.67	.651
	♀	39	.60–.67	.657
Axilla to Groin	♂	22	20–32	27.8 mm.
	♀	49	20–34	26.6 mm.
Arm	♂	21	16–21	18.6 mm.
	♀	49	15–21	17.8 mm.
Leg	♂	22	28–37	33.0 mm.
	♀	50	26–36	31.7 mm.
Head Length	♂	22	10.0–13.5	12.3 mm.
	♀	50	10.0–13.5	11.8 mm.
Head Breadth	♂	22	6.8–10.0	8.4 mm.
	♀	50	6.5–10.0	8.1 mm.
Scales about Body	♂	22	28–31	29.9
	♀	50	28–32	29.7

"Few of these skinks were found at Boma or Matadi and none at Zambi and Banana; but at Noki, on the Angolan shore, they were more numerous, and at Shark Point, at the mouth of the Congo, abundant. Here a Portuguese fishery, with heaps of refuse upon which numerous insects and their larvæ fed, formed a great attraction for these lizards. Hundreds of them burrowed in the sandy beach, sometimes so close to the sea that they were washed from their hiding places by the waves. Places slightly covered with vegetation were usually chosen, where their tunnels would not cave in easily. Instead of running to escape capture, they preferred to dig into the loose sand and remain quiet for awhile. On the mangrove-covered or muddy shore none of these skinks were found and in St. Antonio nearby they were scarce. They probably like to frequent the sandy banks of rivers and the shores of the Atlantic" [H. L.].

Lygosoma Gray

Section *Leiolopisma* Duméril and Bibron

Lygosoma reichenowii Peters

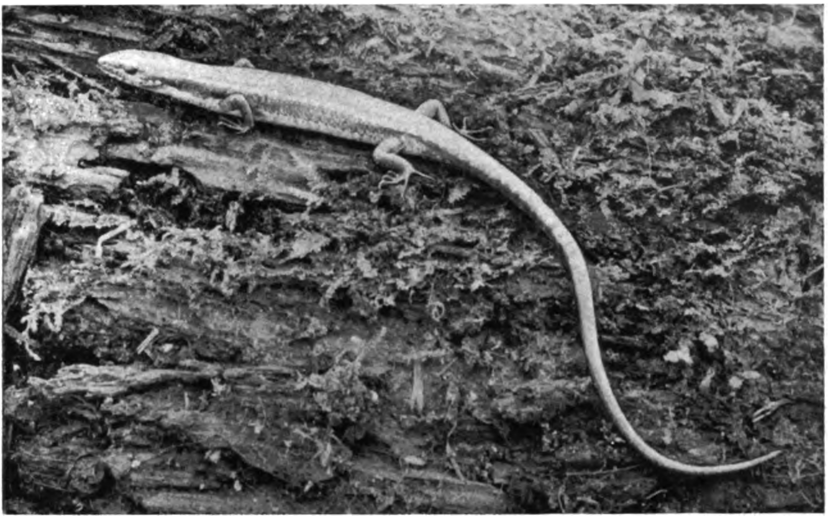
Plate XXVIII, Figure 1

Lygosoma (*Mocoa*) *reichenowii* Peters, 1874, Monatsber. Akad. Wiss. Berlin, p. 160.
Lygosoma reichenovii Boulenger, 1887, Cat. Lizards, III, p. 266. Mocquard, 1897, Bull. Soc. Philom. Paris, (8) IX, p. 8. Boulenger, 1900, Proc.

PLATE XXVIII

Figure 1. *Lygosoma reichenowii* Peters. A. M. N. H. No. 11196; ♀; length 123 mm.

Figure 2. *Lygosoma breviceps* (Peters). A. M. N. H. No. 11197; ♂; length 160 mm.



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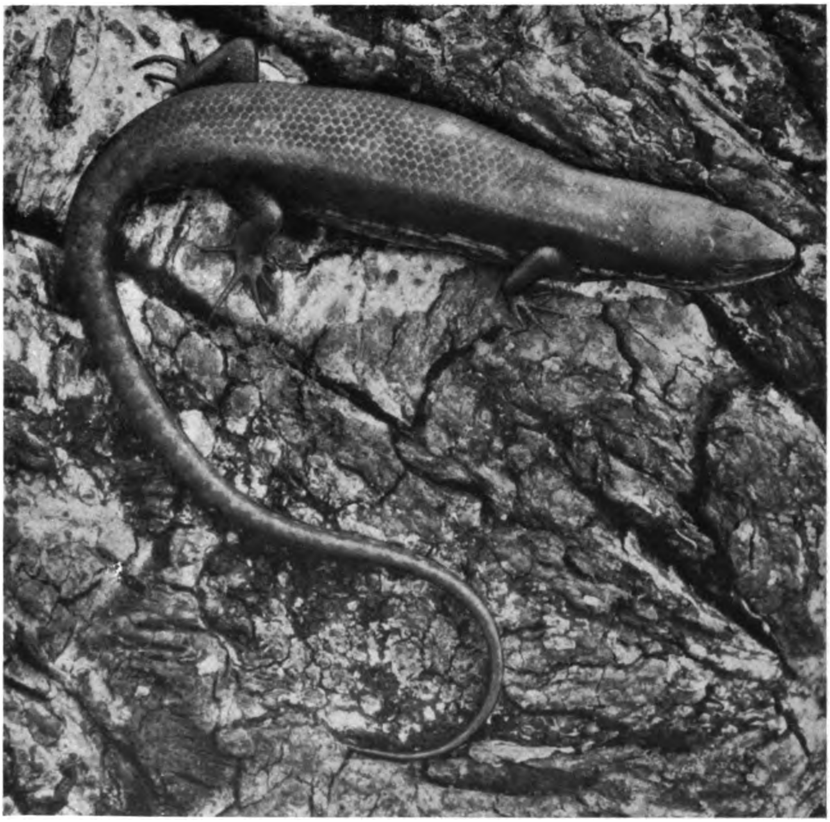

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Zool. Soc. London, p. 450. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 675. Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 206. Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 580.

Euprepes reichenowii Reichenow, 1874, Arch. Naturg., XL, p. 294.

Three specimens of this graceful and delicately colored species were taken in the Ituri Forest: A. M. N. H. Nos. 11194–95 (April 1914), 11196 (May 1914) from Medje.

This species has been recorded hitherto only from Kamerun, Gaboon, and the island of Fernando Po. A specimen in the collection of the University of Michigan, from Kribi, Kamerun, has been available for comparison, and adds to the evidence of the great uniformity of the forest species throughout its range.

Only one of the present specimens has a complete tail, with a total length of 123 mm., and a body length of 45 mm.; a specimen without a tail measures 46 mm. from anus to snout. The tail length is .62 to .63 of the total — midway between the measurements of Boulenger (1887, p. 266), .66, and Müller (1910, p. 581), .58.

The prefrontals form a suture. The anterior loreal touches the first labial in a point, or is narrowly separated from it. The parietals meet behind the interparietal. The supraciliaries number 7–7 in one specimen, 8–8 in two. There are three upper labials before the subocular.

The scales about the body are 24 in one specimen, 22 in two, the two mid-dorsal rows wider. The preanal scutes are noticeably enlarged. The ventrals from anus to chin shields number from 51 to 58. The scales beneath the fourth toe number 21 (25 in the Kamerun specimen).

The coloration in life, from the field notes, accords well with previous descriptions:

> Dorsum brown, with numerous darker brown and some yellowish markings. Crown dark greenish gray. A dark lateral band from tip of snout to base of hind limbs. Throat gray, venter pale yellowish, including lower sides of limbs and tail. Scattered black spots on the venter, beginning at the arms, more numerous toward the anus and on the tail. [L. and C.]

The lateral band in the Kamerun specimen is faint, but Müller (1910, p. 580) has recorded variation in this character in the same region.

Measurements and Scale Characters

A. M. N. H. No.	11194	11195	11196	Zool. Mus. U. M. No. 35617
Sex	♂	♂	♀	♀
Length	111		123	107 mm.
Body	42	46	45	40 mm.
Tail	69		78	67 mm.

A. M. N. H. No.	11194	11195	11196	Zool. Mus. U. M. No. 35617
Tail/Length			.63	.62
Axilla to Groin	23	26	24	22 mm.
Snout to Arm	15	16	17	15 mm.
Arm	13	13	13	13 mm.
Leg	17	17	17	16 mm.
Head Length	9.3	10	10	9 mm.
Head Breadth	6.5	6.	6.	6 mm.
Scales about Body	24	22	22	24
Scales Anus to Gulars	51	58	56	56
Supraciliaries	7–7	8–8	8–8	8–8

Section *Emoia* Gray

Lygosoma breviceps (Peters)

Plate XXVIII, Figure 2; Text Figure 24

Euprepis (*Mabuia*) *breviceps* Peters, 1873, Monatsber. Akad. Wiss. Berlin, p. 604.
Euprepis breviceps Reichenow, 1874, Arch. Naturg., XL, part 1, p. 294.
Euprepis (*Mabuia*) *breviceps* Peters, 1875, Monatsber. Akad. Wiss. Berlin, p. 197.
Lygosoma breviceps Boulenger, 1887, Cat. Lizards, III, p. 300. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 676. Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 206. Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 588.
Mabuia batesi Boulenger, 1900, Proc. Zool. Soc. London, p. 449, Pl. xxi, fig. 2. Mocquard, 1902, Bull. Mus. Hist. Nat. Paris, VIII, p. 410.
Lygosoma buchneri Werner, 1909, Jahrs. Ver. Naturk. Württemberg, LXV, p. 62.

Four specimens from the forest region have been identified with this species, which has previously been recorded from Kamerun, Gaboon, and Fernando Po: A. M. N. H. Nos. 11197 (April 1914), 11198–99 (June 1914), 11200 (July 1914) are from Medje.

All of the present specimens have the pterygoid suture well-developed, and *Mabuya batesi* is placed in the synonymy on the authority of Müller (1910, p. 588). The pattern of coloration of the dorsum figured by Boulenger (1900, Pl. xxxi, fig. 2) seems very distinctive, and its presence in specimens with the typical *Lygosoma* palate is perhaps the best evidence in support of Müller's view. A metatype of *M. batesi* at the Museum of Comparative Zoology is certainly a *Lygosoma*.

The greatest length in the Ituri specimens is 160 mm., body length 59 mm. The single female specimen is of much stouter proportions than the males and reaches a body length of 70 mm. The tail is .60 to .63 of the total length.

The prefrontals form a suture in two specimens, meet in a point in one, and are separated in the fourth, separate also in a specimen from Kamerun (Mus. Zool. Univ. Mich., No. 38312). The anterior loreal region presents an interesting anomaly. In No. 11200, as well as in the Kamerun specimen, there are two loreals, of which the anterior is much the shorter and higher, with a forward projection above so that it meets the frontonasal and supranasal. In the three remaining specimens, there is only a single scale between the preoculars and the postnasal, but the forward projection of the normal anterior loreal remains as a distinct scale, suggesting a second supranasal rather than a loreal (Fig. 24). This difference, in view of the known variability in the supranasal region in this species, does not, on the present material, warrant distinction. The supraciliaries number 7–7 in four specimens, 7–8 in the one remaining.

The scale rows about the body are 36 in two specimens, 38 in two, and 32 in the Kamerun example. The ventrals from anus to chin shields vary between 57 and 61; they are 52 in the Kamerun specimen.

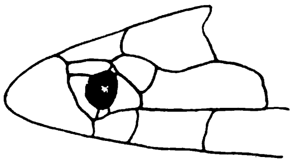


Fig. 24. Nasal region in *Lygosoma breviceps* (11199). The anterior loreal is much reduced.

The coloration is almost exactly portrayed in Boulenger's figure of *Mabuya batesi* (1900, Pl. XXXI), but is distinct in only two of the six specimens examined. Traces of light spots preceded by black ones can, however, be made out in all. A lateral light line similar to that of *Mabuya raddoni* is present in three of the five specimens. The colors in life are:

> Greenish brown above with lighter dots in two rows, and darker dots between these. A broad dark brown lateral band, edged above with a pale yellow line and below with a white stripe, extending from eye to base of hind limb. Tip of tail pale reddish brown. Venter glossy white, mottled with brown and yellow below the lateral white stripe. Throat and chin with dark lines between the scale rows. Tail indefinitely spotted with yellow. [L. and C.]

Measurements and Scale Characters

A. M. N. H. No	11197	11198	11199	11200	Zool. Mus. U. M. No. 38312
Sex	♂	♂	♂	♀	♂
Length	160	143	135	125	165 mm.
Body	59	57	65	70	60 mm.
Tail	101	86	70	55	105 mm.
Tail/Length	.63	.60	r	r	.63
Axilla to Groin	33	31	36	41	35 mm.
Snout to Arm	20	21	22	22	21 mm.
Arm	18	17	19	19	18 mm.
Leg	23	21	26	24	22 mm.
Head Length	12.5	12	15	14	14 mm.
Head Breadth	9	9	10	10	9.5 mm.
Scales about Body	38	36	36	38	32
Scales Anus to Gulars	61	57	58	58	52
Lamellæ of Fourth Toe	14	11	12	13	10
Supraciliaries	7–7	7–8	7–7	7–7	7–7

Section *Riopa* Gray

Lygosoma fernandi (Burton)

Tiliqua fernandi BURTON, 1836, Proc. Zool. Soc. London, part 4, p. 62. GRAY, 1845, Cat. Lizards, p. 110. PETERS, 1874, Monatsber. Akad. Wiss. Berlin, p. 372.

Lygosoma fernandi BOULENGER, 1887, Cat. Lizards, III, p. 304. BOETTGER, 1887, Ber. Senck. Ges., p. 29. BOULENGER, 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 277. WERNER, 1897, Verh. Zool.-Bot. Ges. Wien, XLVII, p. 401. MOCQUARD, 1897, Bull. Soc. Philom. Paris, (8) IX, p. 8. SJÖSTEDT, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 13. WERNER, 1899, Verh. Zool.-Bot. Ges. Wien., XLIX, p. 134. BOULENGER, 1900, Proc. Zool. Soc. London, p. 450. WERNER, 1902, Verh. Zool.-Bot. Ges. Wien, LII, p. 342. TORNIER, 1902, Zool. Jahrb. (Syst.), XV, p. 676. BOULENGER, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 206. JOHNSTON, 1906, Liberia, II, p. 814, fig. MÜLLER, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 540. PERACCA, 1909, in Il Ruwenzori, I, p. 169. NIEDEN, 1910, Arch. Naturg., LXXVI, part 1, p. 239. STERNFELD, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 199.

Plestiodon harlani HALLOWELL, 1845, Proc. Acad. Nat. Sci. Phila., p. 170.

Euprepis harlani HALLOWELL, 1857, Trans. American Philos. Soc., (2) XI, p. 74, Pl. III, fig. 2.

Euprepis striatus HALLOWELL, 1854, Proc. Acad. Nat. Sci. Phila., p. 98; 1857, Trans. American Philos. Soc., (2) XI, p. 74, Pl. III, fig. 1. DUMÉRIL, 1858, Arch. Mus. Hist. Nat. Paris, p. 178, Pl. XV, fig. 1.

Euprepis (*Tiliqua*) *elegans* FISCHER, 1883, Oster Prog. Akad. Gymn. Hamburg, p. 3, Pl., figs. 13–15.

Euprepes leoninus FISCHER, 1884, Abh. Naturw. Ver. Hamburg, VIII, Heft 2, p. 7.

Tiliqua nigripes MÜLLER, F., 1885, Verh. Ges. Basel, VII, p. 704.

Eleven specimens of this species were collected: A. M. N. H. No. 11210 (June 1914) is from Avakubi; 11207 (August 1910), 11208 (September 1910), 11209 (June 1914), Medje; 11211 (November 1910), Niangara; 11201–06 (August 1909), Stanleyville.

Lygosoma fernandi is one of the typical species of the Rain Forest, but it is of frequent occurrence in the forest "islands" outside of the continuous forest and is possibly able to adapt itself to varying conditions. The nearest records to the present are those of Peracca (1909, p. 169) in Uganda to the east, and of Boulenger (1897, p. 277) to the south at Nyangwe on the Lualaba.

The largest specimen, a male, measures 366 mm., with a body length of 165 mm. The total length is somewhat less, the body length somewhat greater than the measurements given by Boulenger (1887, p. 304). The tail is broken or reproduced in seven of the eleven specimens, ranging from .52 to .55 of the total length when uninjured.

The scales about the body vary from 34 to 38 (mean 37), the highest number quoted by Boulenger being 36. The specimens examined from Gaboon and Liberia have a smaller number of scale rows, 32–34. The number of scales from anus to occiput, 57–65, is also somewhat higher in the present series than in the western specimens, in which the range is 56–61.

The coloration in life is dark brownish above, the sides bright salmon-red with black vertical (or V-shaped) bars; venter, and under side of limbs, pale straw-color, with the exception of the darker toes. The head above is darker brown than the rest of the body. The venter may be tinged with pink. The tail is dark brown above, with intermixed whitish scales, or with irregular cross-bars or rings; these, in some specimens, especially for the posterior two-thirds, are light blue. The lateral bars are usually bordered with scattered white scales, or with scales of brighter red than the interspaces. The tip of the lower jaw is red in two male specimens. [L. and C.]

The black bars are usually confluent into a longitudinal band anterior to the arm. Only in a few cases is an approach to the V-shape observable in the lateral dark marks (see Duméril's figure, above cited). No longitudinal streaks are observable on the belly and throat. The longitudinal striation of the back, between the scale rows, seems to become much more distinct in faded specimens. No mention is made of it in the field notes. The reproduced tail is black, without the vivid markings described above. The scales on the reproduced portion are smooth, somewhat wider than the normal scales, and there is a row of markedly widened scales beneath. In the normal tail the keels fade gradually, disappearing about midway, and the scales above and below are equal.

Parasitic worms were taken from the anus of one specimen, and another had a tick between the scales of the tail.

Measurements and Scale Characters

A. M. N. H. No.	11201	11202	11203	11204	11205	11206	11207	11208	11210	11211	
Sex	♂	♂	♀	♀	♂	♂	♂	♂	♀	♂	
Length	324	[231]	264		[224]	[248]	303	366	253	[264]	mm.
Body	152	162	117	105	127	158	138	165	122	142	mm.
Tail	172	[69]	147		[97]	[90]	165	201	131	[122]	mm.
Tail/Length	.53		.55				.54	.54	.52		
Axilla to Groin	91	92	70	63	77	91	82	97	74	88	mm.
Snout to Arm	50	53	41	33	40	53	47	56	40	45	mm.
Arm	39	37	31	26	31	39	36	38	31	34	mm.
Leg	46	46	36	31	39	48	42	45	36	41	mm.
Head Length	29	30	23	20	24	30.5	28	32.5	23	28	mm.
Head Breadth	25	26.5	18.5	16	20	26.5	23	29	20	23	mm.
Scales about Body	34	37	38	38	36	38	38	37	36	38	
Scales from Occiput to Anus	61	63	64	65	64	64	63	64	63	64	
Labials	$\frac{7-7}{7-7}$	$\frac{8-8}{8-9}$	$\frac{8-8}{8-9}$	$\frac{8-8}{8-9}$	$\frac{8-8}{8-8}$	$\frac{8-8}{8-8}$	$\frac{8-8}{8-8}$	$\frac{8-8}{8-8}$	$\frac{8-8}{8-8}$	$\frac{8-8}{8-8}$	
Lamellæ beneath Fourth Toe	17	14	15	16	12	17	12		15	12	

"This is the largest skink we saw in the Rain Forest and it occurs also in the forest galleries of the savannah of the northeastern Uele as far north as Dungu. Of the thirty specimens taken, a male more than 14 inches in total length holds the record; the females are not only smaller but are also duller in color. The size of the somewhat cylindrical body, the glossy, bright salmon-red flanks marked with a series of white-edged, black crossbars, the dark-brown back, and partly bluish tail readily distinguish this species from any other lizard occurring in these regions.

"It loves the moister sites and in the soft ground digs a single channel leading to a spacious burrow, which in plantations is often hollowed beneath a heavy root, perhaps as an added protection. The earth is loosened with the small legs, and the blunt head and stout neck play an important part in pressing aside and smoothing the particles of soil in the gallery. Most of the specimens caught were taken in nooses laid at the entrance to the burrow, which is easily recognized from those made by other animals by its unusual smoothness. Although these skinks can be dug out easily, the natives are horrified at the thought of touching them alive, and just to see one scurry off is considered so bad an omen by the Medje, Mangbetu, and other tribes, that they abandon all plans for the day and return to the village. The skin breaks easily and many of the lizards were rendered useless for our collection by their endeavor to tear away from the noose. It is surprising that the tail of so large a lizard can be dropped with such ease, and regenerates so well.

"This giant skink is relatively scarce and habitually lives singly; only once was a pair caught in the same refuge. The natives assured me that each skink has a number of galleries, a fact I was never able to ascertain, but of twelve burrows dug up in a plantation at Medje eleven were empty and only one contained a specimen. These lizards are not dependent on the warmth of the sun; and, although individuals were seen during the day, those caught at night prove that they are at least partly nocturnal. To their sluggishness is probably due the fact that they never move far from their homes. In case of danger they disappear in any cavity offering a suitable retreat. When held, they show considerable muscular power in attempting to wrench themselves free and they bite readily, but from personal experience I know scratches made by their little teeth are not harmful although the natives consider the species dangerous. The food consists of various insects, many of them hard-shelled, gathered from the ground among the leaves and other débris" [H. L.].

Lygosoma sundevallii (Smith)

Plate XXIX

Eumeces (*Riopa*) *sundevallii* Smith, 1849, Ill. Zool. S. Africa, III, App. p. 11.

Lygosoma sundevallii Boulenger, 1887, Cat. Lizards, III, p. 307. Mocquard, 1888, Mém. Cent. Soc. Philom. Paris, p. 118. Boulenger, 1891, Proc. Zool. Soc. London, p. 306. Steindachner, 1891, Sitzber. Akad. Wiss. Wien (math.-natur.), C, part 1, p. 313. Pfeffer, 1892, Jahrb. Hamburg. Wiss. Anst., X, p. 75. Günther, 1893, Proc. Zool. Soc. London, p. 618. Stejneger, 1893, Proc. U. S. Nat. Mus., XVI, p. 722. Bocage, 1895, Herpétol. Angola, p. 49. Boulenger, 1896, Proc. Zool. Soc. London, p. 215; 1896, Ann. Mus. Stor. Nat. Genova, (2) XVII, pp. 10, 20, and 278. Johnston, 1897, British Central Africa, p. 361. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 45; 1900, Zool. Jahrb. (Syst.), XIII, p. 599, fig. Boulenger, 1902, in Johnston, Uganda Protectorate, p. 446; 1902, Proc. Zool. Soc. London, II, p. 17. Mocquard, 1902, Bull. Mus. Hist. Nat. Paris, VIII, p. 405. Werner, 1902, Verh. Zool.-Bot. Ges. Wien, LII, p. 335. Boulenger, 1907, Proc. Zool. Soc. London, p. 486; 1909, Ann. Mus. Stor. Nat. Genova, (3) IV, p. 310. Chubb, 1909, Proc. Zool. Soc. London, p. 594. Boulenger, 1910, Ann. South African Mus., V, p. 486. Meek, 1910, Field Mus. Publ. Zool., VII, p. 412. Peracca, 1910, Boll. Mus. Torino, XXV, No. 624, p. 3. Scheben, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 295, figs. Werner, 1910, Denkschr. Med. Naturw. Ges. Jena, XVI, p. 350. Boulenger, 1911, Ann. Mus. Stor. Nat. Genova, (3) V, p. 163. Sternfeld, 1911, Sitzber. Ges. Naturf. Freunde Berlin, p. 249; 1911, Mitt. Zool. Mus. Berlin, V, p. 408. Boulenger, 1912, Ann. Mus. Stor. Nat. Genova, (3) V, p. 330. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 245. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 87.

Eumeces afer Peters, 1854, Monatsber. Akad. Wiss. Berlin, p. 619.

Eumeces reticulatus Peters, 1862, Monatsber. Akad. Wiss. Berlin, p. 23.

Eumeces perdicilor Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 317.

Eumeces (*Senira*) *dumerili* Steindachner, 1870, Sitzber. Akad. Wiss. Wien, LXII, part 1, p. 341, Pl. iii, fig. 5.

Eumeces sundevallii Peters, 1882, Reise nach Mossambique, III, p. 75, Pl. xi, fig. 2.

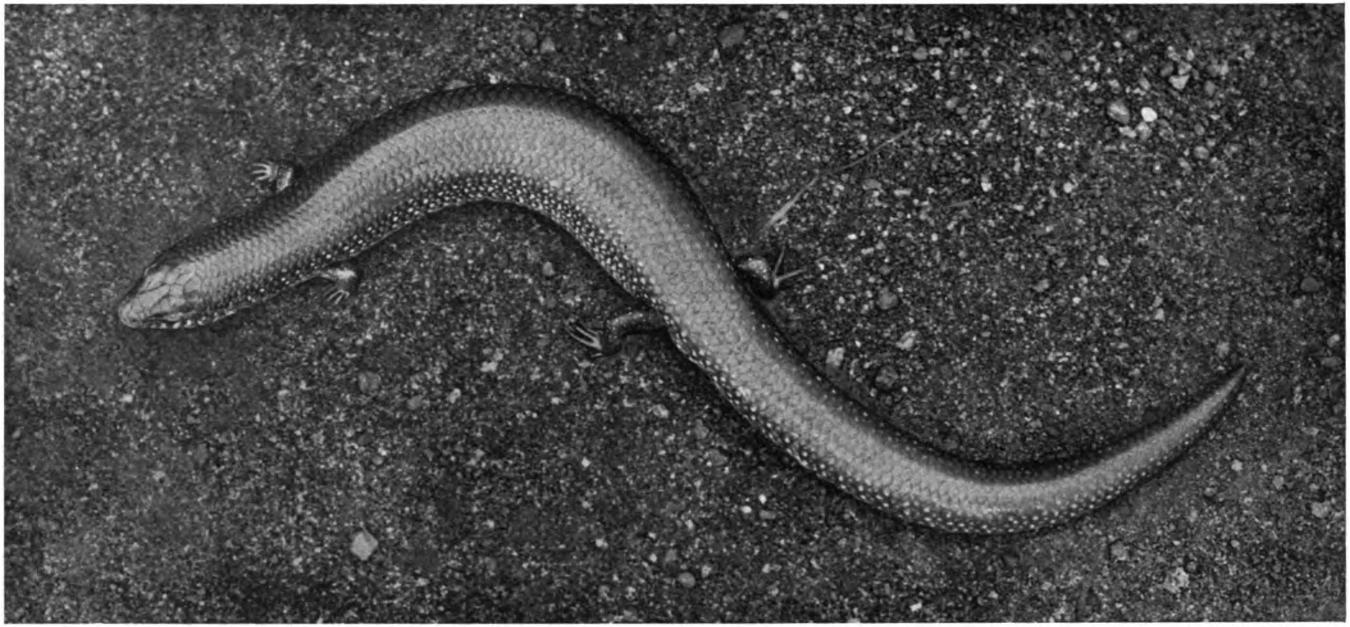
Mochlus punctatus Günther, 1864, Proc. Zool. Soc. London, p. 317; 1864, Zool. Rec., p. 111.

Euprepes chaperi Vaillant, 1884, Bull. Soc. Zool. France, p. 346, Pl. xii, fig. 2; 1884, Bull. Soc. Philom. Paris, (7) VIII, p. 169.

Nieden (1913, p. 87) and other herpetologists have united *Lygosoma læviceps* (Peters), =*L. modestum* (Günther), with *L. sundevallii* (Smith). It appears probable, in the writer's opinion, from geographic analogy, that *L. guineense* (Peters) inhabiting Portuguese Guinea, Togo, and the Niger region of West Africa may prove to intergrade with the present form in the

PLATE XXIX

Lygosoma sundevallii (Smith). A. M. N. H. No. 11225; ♂; length 179 mm.



intermediate region. *L. sundevallii* inhabits practically the whole of the open country of Africa south of the Sahara, with the exception of the range of *L. guineense.*

A. M. N. H. Nos. 11213–14 (May 1912), 11215–25 (June 1912) are from Garamba; 11212 (November 1911), Yakuluku.

The largest specimen procured by the American Museum Congo Expedition measures 179 mm., with a body length of 90 mm. The maximum body length is 95 mm. The tail length varies from .45 to .53 of the total. Much larger specimens are recorded by Sternfeld (1912, p. 246).

The squamation of the head is normal and uniform. The scales about the body vary from 26 to 30, from anus to chin between 62 and 72. The lamellæ beneath the fourth toe are constant in number, 10–12. The supraciliaries are 5–7 in one specimen, 6–6 in eight, 6–7 in one, and 7–7 in four.

The coloration (in alcohol) of a juvenile specimen is brown above, with an iridescent sheen, creamy white below. Upper labials each with a dark mark, with fainter ones on the head shields. A few dark spots on gulars and sides of throat. Sides of tail somewhat varied with light and dark spots.

An adult is similarly colored, but with faint longitudinal lines on the middle third of each scale row on the back. These lines are interrupted on the sides, but the resulting spots are much more distinct, due to the absence of pigment on the lateral portions of the scales. The upper and lower labials are strongly marked with black. Dark spots along the sides of chin and throat, and scattered beneath the tail.

Measurements and Scale Characters

A. M. N. H. No.	11213	11214	11215	11216	11220	11222	11224	11225
Length	78	118	81	112	119	120	121	179 mm.
Body	43	55	40	56	56	58	60	90 mm.
Tail	35	63	41	56	63	62	61	89 mm.
Tail/Length	.45	.53	.50	.50	.53	.51	.50	.50
Axilla to Groin	27	34	23	36	37	36	37	57 mm.
Snout to Arm	13	17	13	17	19	17	17	29 mm.
Arm	8	10	8	10	9	10	9	11 mm.
Leg	11	14	11	13	14	14	14	17 mm.
Head Length	8	10	8	10	10	10	10	14 mm.
Head Breadth	6.7	8.0	6.2	8.0	7.5	8.0	8.0	11 mm.
Scales about Body	26	28	26	28	27	28	28	26
Scales, Anus to Chin-shields	71	65	62	68	68		66	69
Scales beneath Fourth Toe	12	12	11	12	12	10	10	12
Supraciliaries	7–7	6–6	7–7	6–6	6–6	6–6	6–6	6–6

"These skinks are related to the *Mabuya* and can be recognized easily by the short, blunt head and thick, cylindrical body and tail, which is abruptly pointed. Most specimens have a regenerated tail, much shorter than that of the lizard illustrated, an especially fine specimen, measuring 7 inches (178 mm.) in total length (Pl. XXIX). In rapid progression, the smooth, glossy, dark-brown body moves in snakelike fashion, for the feet are so reduced as to be of little assistance. We found them only in the northeastern Congo, and although their true habitat is undoubtedly the open savannah, nearly all of those taken came from native plantations. They were in the loose earth beneath heaps of decaying vegetable matter, logs, and pieces of bark, where, near the surface, they burrow passageways large enough to turn around in. They move about much less than one might expect of a lizard, and may stay for months at a time in one spot, perhaps owing to the fact that in their hiding places they can rest securely and yet have an abundance of food about them, for the animals most suitable to their taste either live there in numbers, such as termites, or come there occasionally to seek refuge, such as crickets and spiders. Indeed, these and beetle larvæ, the egg cases of spiders and sometimes a grasshopper, furnish easy subsistence" [H. L.].

Ablepharus Fitzinger

Ablepharus cabindæ Bocage

Ablepharus cabindæ Bocage, 1866, Jorn. Sci. Lisboa, I, p. 64; 1867, III, p. 8. Peters, 1877, Monatsber. Akad. Wiss. Berlin, p. 614. Bocage, 1887, Jorn. Sci. Lisboa, XI, p. 3. Boulenger, 1887, Cat. Lizards, III, p. 352. Boettger, 1887–1888, Ber. Senck. Ges., p. 29. Bocage, 1895, Herpétol. Angola, p. 51, Pl. v, fig. 3. Boulenger, 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 277.
Panaspis æneus Cope, 1868, Proc. Acad. Nat. Sci. Phila., p. 317.
Ablepharus æneus Boulenger, 1887, Cat. Lizards, III, p. 352.

This small skink is represented by sixty-three specimens: A. M. N. H. Nos. 11232–44 (July 1915), are from Banana; 11226 (June 1915), Boma; 11245–88 (July 1915), Malela; 11227 (June 1915), 11228–31 (July 1915), Zambi.

Ablepharus cabindæ is known only from a relatively limited area on the West Coast from Capangombe in Mossamedes to Chinchoxo in Loango.

Boettger, (1888, p. 29) has given reasons for uniting *Ablepharus æneus* Cope with *cabindæ*, from which it is distinguished only by the fewer supraoculars. This is fully borne out in the present series; except that there are many more specimens with 4 supraoculars than with 3: seven with supraoculars 3–3, four with 3–4, and fifty-two with 4–4. Since these forms inhabit the same region, with no other distinction, they are undoubtedly variations of a single species.

Slight variation is observable in other scale characters. The supraciliaries vary from 4 to 6, usually 5. The supralabials anterior to the subocular, normally 4, may be 5. The normal wide suture between rostral and frontonasal is much narrowed in a single specimen. The extent of the small suture between the frontonasal and frontal is more variable. In one specimen the prefrontals form a suture; in one they are separated by a small inter-prefrontal; and in one they are united into a single transverse shield. In the latter specimen, the frontonasal is transversely divided into a small anterior and large posterior shield. In seven specimens the frontonasal, frontal, and prefrontals meet in a point.

The regenerated tail is usually covered with scales much larger than the normal, four in a series around it.

Six of the dorsal rows are brown, and these and the two lateral rows are traversed on their centers by a longitudinal darker line (one-fourth to one-third the width of the scale). Between the outer two of these dark lines, the interspace is light, especially anteriorly. Below this, the sides are somewhat darker brown, outlined in some cases, with a second light line below, which begins at the lower posterior corner of the eye and extends backward through the ear, and above the arm. Tail like dorsum; sides more or less spotted. The dorsal brown varies in shade and hue. The venter may be greenish white or yellow, the scales somewhat outlined with darker.

Summary of Measurements and Scale Characters

	Sex	No. of Specimens	Extremes	Average
Length	♂	8	75–99	86.6 mm.
	♀	26	65–98	86.8 mm.
Body	♂	18	32–42	36.9 mm.
	♀	41	26–42	35.3 mm.
Tail	♂	8	43–63	50.2 mm.
	♀	26	37–60	51.0 mm.
Tail/Length	♂	8	.56–.63	.58
	♀	29	.51–.64	.58
Axilla to Groin	♂	18	19–28	25.9 mm.
	♀	41	16–27	22.2 mm.
Arm	♂	18	7.0–8.0	7.3 mm.
	♀	41	5.5–8.0	7.0 mm.

	Sex	No. of Specimens	Extremes	Average
Leg	♂	18	10.0–11.5	10.6 mm.
	♀	41	8.0–12.0	10.0 mm.
Head Length	♂	18	6.5–7.7	7.0 mm.
	♀	40	5.5–7.5	6.6 mm.
Head Breadth	♂	18	4.3–5.5	5.0 mm.
	♀	40	4.0–5.5	4.6 mm.
Scales about Body	♂	18	22–24	23.6
	♀	43	22–24	23.6
Scales from Anus to Chin Shields	♂	18	51–64	56.7
	♀	43	51–62	56.5

"The habits of these little brown skinks are most interesting. Although common in all localities recorded above, one has to know their haunts, for they seldom expose themselves to sunlight, and the patches of short grass, rather dense near the ground, on the sandy flats near the shore furnish excellent hiding places. Only on searching through and separating the grass can these skinks be observed moving about swiftly, more in the fashion of snakes than lizards. For a long time I wondered what they fed upon until stomach contents proved that termites, from the richly provided storerooms covered with but little soil, formed their exclusive diet. Only slight effort with the tip of the head is needed to break into the galleries of these termites, which hurry out in numbers to repair the damage, offering themselves easy prey" [H. L.].

ANELYTROPIDÆ

Feylinia Gray

Feylinia currori Gray

Plate XXIV, Figure 2

Feylinia currori Gray, 1845, Cat. Lizards, p. 129. Bocage, 1873, Jorn. Sci. Lisboa, IV, p. 214. Peters, 1877, Monatsber. Akad. Wiss. Berlin, p. 614 Bocage, 1887, Jorn. Sci. Lisboa, XI, pp. 3, 179. Boulenger, 1887, Cat. Lizards, III, p. 431. Boettger, 1888, Ber. Senck. Ges., p. 33. Bocage, 1895, Herpétol. Angola, p. 57. Boulenger, 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 277. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 47. Werner, 1899, Verh. Zool.-Bot. Ges. Wien, XLIX, p. 134. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 676. Boulenger, 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 206; 1905, Mem. Soc. Esp. Hist. Nat., I, p. 185; 1908, Ann. Mus. Stor. Nat. Genova, (3) IV, p. 7. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 199. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 90.

Feylinia currori grandisquamis Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 591.

Anelytrops elegans Duméril, 1856, Rev. Mag. Zool., (2) VIII, p. 420, Pl. xxii, fig. 1. Bocage, 1866, Jorn. Sci. Lisboa, I, p. 45.

There are six specimens of this species in the collection from the forest region of the northeastern Congo. A. M. N. H. No. 11294 (October 1913), is from Akenge; 11291 (April–May 1910), 11292–93 (June 1914), Medje; 11289 (August 1909), 11290 (November 1914), Stanleyville.

These specimens serve to connect the records from Bukoba, German East Africa, and the Sesse Islands in Victoria Nyanza, with the well-known distribution of this species on the West Coast. Obviously it is essentially a forest species.

Boettger (1888, p. 34) has discussed the question of even or odd scale rows in this species. In the six specimens at hand the even numbers predominate. No variation is observable in the squamation of the head. The measurements lie between the recorded extremes. The tail length averages .27 of the total, .33 being the average from the literature. The body diameter is .061 to .077 of the body length. The number of scales about the body is constant, 26–27.

The colors in life are dark bluish gray, appearing black at a distance, the venter somewhat lighter, or of the same color, the snout light gray. One of the specimens was taken in the grass at Stanleyville. [L. and C.]

In the tabulation below, the scale counts are taken at the first regular scale row behind the head, at the middle of the body, and immediately in front of the anals. The length of the head is measured to the posterior border of the interparietal.

Measurements and Scale Characters

A. M. N. H. No.	11289	11290	11291	11292	11293	11294
Length	358			291	324	340 mm.
Body	246	163	232	215	231	258 mm.
Tail	112			76	93	82 mm.
Tail/Length	.31			.26	.29	.24
Head Length	10.7	7.5	10	9.2	10.5	11 mm.
Body Diameter	18	10			18	19 mm.
Diameter/Body	.073	.061			.077	.073
Scales about Body	26–26–24	26–27–24	25–26–23	25–26–24	26–26–22	26–26–22

"This degraded skink glides with great ease on its smooth, slightly flattened, legless body, unhampered by the fact that its eyes are concealed beneath the skin. Sunlight apparently causes no inconvenience, as a specimen from Stanleyville was caught in the grass at noon. Hearing, however, seems to be well developed, for footsteps may bring them to a standstill. Perhaps this is an important faculty in finding their food supply, which consists mostly of termites; these, when disturbed, make considerable noise in their movements. *Feylinia currori* likes to rest under decaying logs and other vegetable matter, and the termites, rushing toward the intruder there, can readily be eaten. Occasionally a small centiped is swallowed. To reach such places they need not exert much muscular power, since the ground near the surface is soft, and the smooth tipped head and mandible can easily burrow through such a substance. These skinks have no means of defending themselves, and, when held, not even the broadened short tongue is thrust forward; but they may feign death and [Plate XXIV, Fig. 2] have a curious way of doubling up and suddenly jerking either half of the body when touched. The natives are afraid to pick them up, believing that these reptiles possess a head on either end and can, unnoticed, enter and escape from the body of any person during the night, causing his death. Those who discover the skink in its lair, however, and do not disturb it will never be visited thus — a reason that the natives refuse to kill them" [H. L.].

Artificial Key to the Species of Scincidæ and Anelytropidæ Occurring in the Rain Forest

A. Limbs well developed; palatines meeting in the middle line of the palate.
    B. Palatal notch extending as far forward as the middle of the eye; dorsal scales keeled; a transparent disc in the lower eyelid. (*Mabuya*).
        C. Supraciliaries 3; scales of back tricarinate... *M. bensonii.*
        CC. Supraciliaries 5 or more.
            D. Supraciliaries 5; dorsal scales quinque-carinate, sometimes 6–9-carinate; dorsum and sides, especially in the male, flecked with yellow...... *M. maculilabris.*
            DD. Supraciliaries 6–8.
                E. A well marked lateroventral light line from ear to groin (rarely absent); dorsal scales tricarinate, sometimes quinque-carinate.......... *M. raddoni.*
                EE. No lateroventral line; dorsal markings more or less distinct, transverse; dorsal scales mostly 9–15-carinate..................... *M. polytropis.*

BB. Palatal notch not extending as far forward as the middle of the eye; dorsal scales keeled; no transparent disk in the lower eyelid; transverse lateral black and red bars.... *Lygosoma fernandi.*

BBB. Palatal notch not extending to middle of eye; lower eyelid with a transparent disc; dorsal scales smooth........ (*Lygosoma*, part).

C. Scales about body 37–38; a dorsal pattern of dark spots arranged in two longitudinal rows, each spot preceded by a light spot of about equal size.............. *L. breviceps.*

CC. Scales 20–24; dorsum not as above.

D. Habitus slender; adpressed limbs overlap. *L. reichenowii.*

DD. Habitus plump; adpressed limbs separated by about the length of the arm.................. *L. vigintiserierum.*

CCC. Scales 24–26.

D. Habitus slender; adpressed hind limb reaching the elbow of fore limb........................... *L. rohdei.*

DD. Habitus stouter; adpressed limbs separated by the length of the fourth finger.......... *L. gemmiventris.*

AA. Limbs absent; palatines separated on the median line of the palate.

B. Eye external, small; nostril between the rostral and first labial. *Melanoseps occidentalis.*

BB. Eye covered by a scale, scarcely visible; nostril pierced in the rostral... (*Feylinia*).

C. Eye behind the 2nd upper labial; scales about body, 20. (? Gaboon).................................. *F. elcgans.*

CC. Eye behind 3rd upper labial; scales, 20–28.... *F. currori.*

CHAMÆLEONTIDÆ

Chamæleon Gronovius

Artificial Key to the Species of *Chamæleon* Occurring in the Rain Forest (Based on Nieden, Fauna Deutsch. Kol., Reihe I, Heft 2)

A. Scales homogeneous, or nearly so; parietal crest present.

B. A gular-ventral crest; male with tarsal process. (Sudanese forms, occasional in the forest).

C. Occipital lobes rudimentary, immovable.......... *gracilis.*

CC. Occipital lobes flap-like, movable................ *dilepis.*

BB. No gular-ventral crest; male without tarsal spur.

C. A faint dorsal crest of isolated tubercles, anteriorly; no occipital lobes; no horns in male. (Ituri).. *adolfi-friderici.*

CC. No dorsal crest; small, rounded, movable occipital lobes; horns in the male.
  D. Male with three horns. (Entire forest)...... *owenii*.
  DD. Male with one horn. (Western)........... *unicornis*.

AA. Scales heterogeneous; parietal crest present or absent, no tubercular dorsal crest.
  B. A dorsal "sail" supported by neural spines, at least in males; no parietal crest. (Known only from West Africa).
    C. A gular crest.
      D. A ventral crest; male with four horns.... *quadricornis*.
      DD. No ventral crest; male with two horns...... *pfefferi*.
    CC. No gular or ventral crest.
      D. Male with two horns...................... *montium*.
      DD. Male without horns..................... *cristatus*.
  BB. No dorsal "sail."
    C. A gular-ventral crest. (West Africa)....... *wiedersheimi*.
    CC. No gular or ventral crest.
      D. Occipital lobes faintly indicated; a parietal crest; a nasal tubercle. (Ituri).................. *ituriensis*.
      DD. Occipital lobes absent; no parietal crest; no nasal tubercle. (West African).............. *camerunensis*.

Artificial Key to Species of *Chamæleon* Occurring in the Sudan

A. Casque much elevated behind, with very high parietal crest. *basiliscus*.

AA. Casque nearly flat above, little raised above the nape.
  B. Occipital lobes present; male with tarsal spur.
    C. Occipital lobes rudimentary, immovable.......... *gracilis*.
    CC. Occipital lobes flap-like, movable................ *dilepis*.
  BB. No occipital lobes; males without tarsal spur.
    C. Lateral crests distinct; casque raised from nape. (Western). *senegalensis*.
    CC. Lateral crests indistinct, faint parietal crest nearly continuous with the low dorsal crest. (Eastern)...... *lævigatus*.

Chamæleon gracilis (Hallowell)

Plate XXX, Figure 1.

Chamæleo gracilis HALLOWELL, 1842, Journ. Acad. Nat. Sci. Phila., p. 324, Pl. XVIII; 1857, Proc. Acad. Nat. Sci. Phila., p. 99.

Chamæleo gracilis DUMÉRIL, 1861, Arch. Mus. Hist. Nat. Paris, X, p. 173.

Chamæleon gracilis Gray, 1864, Proc. Zool. Soc. London, p. 471.
Chamæleo gracilis Bocage, 1866, Jorn. Sci. Lisboa, I, pp. 41, 219.
Chamæleon gracilis Dollo, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 154. Boulenger, 1887, Cat. Lizards, III, p. 448, Pl. xxxix, fig. 4. Mocquard, 1888, Mém. Cent. Soc. Philom. Paris, p. 112. Boettger, 1888, Ber. Senck. Ges., p. 36. Matschie, 1892, Zool. Jahrb. (Syst.), V, p. 613. Boettger, 1893, Zool. Anz., XVI, p. 116. Bocage, 1895, Herpétol. Angola, p. 61. Boulenger, 1895, Proc. Zool. Soc. London, p. 535; 1896, p. 213; 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 278. Werner, 1897, Verh. Zool.-Bot. Ges. Wien, XLVII, p. 397. Boulenger, 1900, Proc. Zool. Soc. London, p. 451. Tornier, 1900, Zool. Jahrb. (Syst.), XIII, p. 606; 1901, Beiheft, Arch. Naturg., LXVII, p. 88; 1902, Zool. Jahrb. (Syst.), XV, p. 676. Werner, 1902, Verh. Zool.-Bot. Ges. Wien, LII, pp. 333, 337, 343; 1902, Zool. Jahrb. (Syst.), XV, p. 336, Pl. xviii. Boulenger, 1905, Ann. Mag. Nat. Hist., (7), XVI, p. 112; 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 207. Tornier, 1905, Zool. Jahrb. (Syst.), XXII, p. 383. Johnston, 1906, Liberia, II, p. 833. Werner, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI, part 1, p. 1861. Boulenger, 1908, Ann. Mus. Stor. Nat. Genova, (3) V, p. 163. Lönnberg, 1910, in Sjöstedt, Kilimandjaro-Meru Exp., I, pp. 4, 9. Nieden, 1910, Arch. Naturg., LXXVI, part 1, p. 239. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentral Afrika Exp., IV, p. 247. Klaptocz, 1913, Zool. Jahrb. (Syst.), XXXIV, p. 285. Werner, 1913, in Brehm's Tierleben, V, p. 222.
Chamæleo granulosus Hallowell, 1856, Proc. Acad. Nat. Sci. Phila., p. 147.
Chamæleo burchelli Hallowell, 1856, Proc. Acad. Nat. Sci. Phila., p. 147.
Chamæleon senegalensis gracilis Peters, 1878, Monatsber. Akad. Wiss. Berlin, p. 612; 1879, p. 202.
Chamæleo (*Chamæleo*) *simoni*, Boettger, 1884 (1885), Ber. Offenbacher Ver. Naturk., p. 175.

Fifty-seven specimens of this widely distributed chameleon indicate its abundance in the eastern Sudan. Two specimens are recorded from the forest border at Poko. The nearest previous record is that of Werner at Gondokoro on the Nile. The distribution map of Werner (1902, p. 312) is unfortunate, as is also the range given by Boulenger, "Tropical Africa," since they miss the cardinal fact in the distribution of the species. It is essentially an open country form, though it may occasionally be recorded from the forest (Kamerun and Liberia). It is one of the forms whose range circumscribes the forest: Angola to Lake Tanganyika, the Central African lake region, Abyssinia, and the whole of the Sudan to Portuguese Guinea.

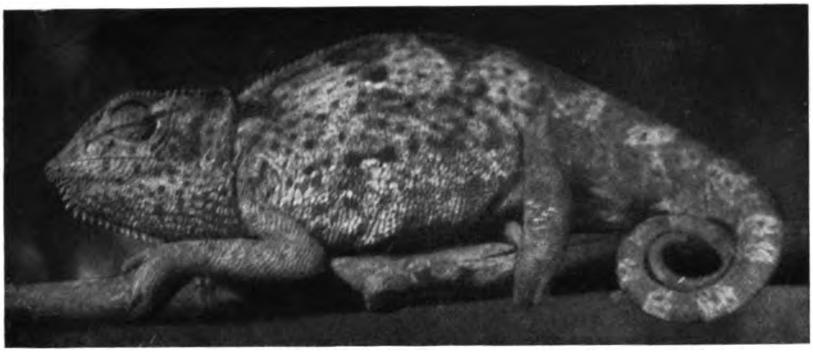
A. M. N. H. Nos. 11331 (March 1911), 11332 (April 1911), 11333–36 (January–March 1912), 11337–38 (February 1912), 11339 (September 1912), and 11344 (October 1912) are from Faradje; 11340 (March 1912), 11341–43 (May 1912), Garamba; 11295–330 (November 1910), 11608 (December 1910), 11345–48 (April 1913), Niangara; 11349–50 (August 1913), Poko.

PLATE XXX

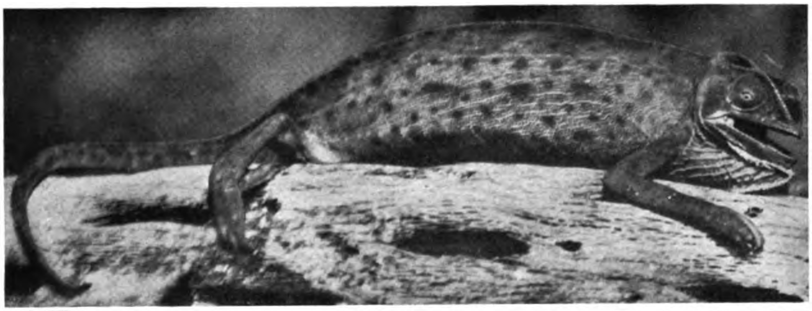
Figure 1. *Chamæleon gracilis* Hallowell. A. M. N. H. No. 11335; ♀; length 239 mm.

Figure 2. *Chamæleon senegalensis lævigatus* Gray. A. M. N. H. No. 11394; ♀; length 177 mm.

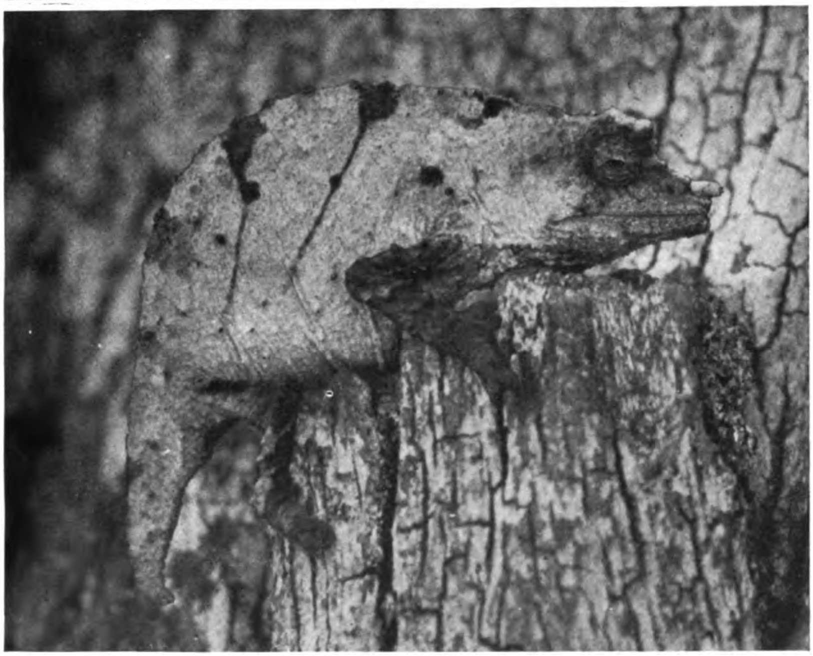
Figure 3. *Rhampholeon boulengeri* Steindachner. A. M. N. H. No. 11576; ♀; length 66 mm. Matching the light gray stump upon which it rests. Compare the color-phases shown on Plate XXXII, Figures 7 and 8. The two oblique marks on the back have been compared with the ribs of a dead leaf.



1



2



3

In the specimens of this species which have been available to the writer there is no approach to *Chamæleon dilepis* to support Sternfeld's statement that there exists no valid reason for separating these species. Certainly the relationship between the forms of *dilepis* is much closer *inter se* than that of any of them with *gracilis*.

The present series contains a female specimen of 343 mm. long — by far larger than the 308 mm. recorded by Boulenger (1887, p. 448) and still quoted by Werner (1911, p. 12); and this specimen measured 357 mm. when freshly killed. The largest male measures only 278 mm., although the males are reported larger than the females in West African specimens. The tail length varies from .43 to .52 of the total, mean .49.

The series is, on the whole, remarkably uniform in the development of the occipital lobes, the cranial crests, and the dorsal and ventral serrations. The tarsal spur of the male is well developed in all cases.

When the animal is annoyed, the gular pouch is enlarged; it opens its mouth widely and hisses hoarsely, trying to bite. When it has taken hold of one's finger, its jaws are with difficulty disengaged. Color changes are frequently observed. A specimen in hand is dark green, with a brownish lateral band and pale white mid-ventral line. Another specimen kept in a white box is pale orange with brighter orange cross-bars and dirty white lateral band. The skin is shed in patches, perfectly colorless. One specimen (No. 11331) was disgorged by a snake.

The general color in life is dark green, with several irregular darker bands from the vertebral line to the broad orange stripe on the sides, which extends from the insertion (n) of the arm three-fourths of the distance to the groin. The ventral serration is pale yellowish. The venter is paler green, dotted with irregular black markings. The gular pouch as well as the head and eyeballs are usually green. The folds of skin between the scales on the throat (often invisible) are usually bright orange. There is a whitish or brownish line beneath the tail. The claws are brownish with black tips. The iris is golden, scarcely visible. [L. and C.]

The ovaries in a specimen taken in March contain 30–30 eggs, about 10 mm. in diameter. In a specimen taken in April they are about 5 mm. in diameter. In specimens taken in August and November they are undeveloped.

Stomach contents show that the species lives chiefly on Orthoptera as Werner observed in the nearby Lado district.

The stomachs contained grasshoppers (Nos. 11334, 11335, and 11341), a mantid (No. 11310), caterpillars and a weevil (No. 11341), a cicada, numerous winged ants and termites, and a muscid fly (No. 11331), and (No. 11335) a carpenter bee (*Xylocopa*) and a wasp (*Polistes marginalis*). A large proportion of stomachs of all of the species of *Chamæleon* have been empty, due probably to their being captured alive and not killed immediately.

Summary of Measurements

	Sex	No. of Specimens	Extremes	Average
Length	♂	20	159–278	205.6 mm.
	♀	36	194–343	254.6 mm.
Body	♂	20	78–142	103.7 mm.
	♀	36	92–175	130.0 mm.
Tail	♂	20	72–136	102.4 mm.
	♀	36	93–176	124.5 mm.
Tail/Length	♂	20	.45–.52	.49
	♀	36	.43–.52	.49
Arm	♂	20	35–60	45.9 mm.
	♀	36	44–70	55.1 mm.
Leg	♂	20	34–59	45.7 mm.
	♀	36	43–69	55.2 mm.
Head Length	♂	20	26–43	32.9 mm.
	♀	36	31–48	38.4 mm.
Snout to Angle of Mouth	♂	20	16.5–28	21.0 mm.
	♀	36	22–31	27.8 mm.
Angle of Mouth to Occiput	♂	20	16.5–27	20.7 mm.
	♀	36	19–31	24.7 mm.
Greatest Width of Head	♂	20	11–19	13.7 mm.
	♀	36	13–21.5	15.4 mm.

Chamæleon etiennei, new species[1]

?*Chamæleon gracilis* Boettger, 1888, Ber. Senck. Ges., p. 36.

Twenty-one specimens (A. M. N. H. Nos. 11351–71, July 1915) of a chameleon from the hills near Banana at the mouth of the Congo are not referable either to *C. gracilis* or *C. dilepis*, although manifestly belonging to the *gracilis-dilepis* group. The fifty-nine specimens recorded as *C. gracilis* from the same locality by Boettger (1888, p. 36) probably belong to the present form, should it prove valid.

Diagnostic Characters

Cranial crests as in *C. dilepis;* occipital lobes as in *C. gracilis;* a dorsal, gular, and ventral serration; no tarsal spur in the male; skin uniformly coarsely granular as in *C. gracilis*.

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[1] Named after Dr. Etienne, the best-known medical authority in the Belgian Congo, who accompanied King Albert on his trip through the Congo Basin and who has made many contributions to the natural history of Banana. During the three months' stay there of the American Museum Expedition he gave every possible assistance to the furtherance of its work.

Detailed description

Type: No. 11370.

Habit as in *C. gracilis*, body scarcely as deep, though this character is variable in *gracilis*. Casque nearly flat above, the distance from the angle of the mouth to the occiput equalling the distance to the snout. Tail shorter than the head and body, .46 of the total length.

Casque slightly raised, with only a faint parietal crest. Lateral crests not continued to the point of the occiput, disappearing where the casque begins to narrow posteriorly, as in the specimens of *C. dilepis* available for comparison. Lateral crests divergent instead of nearly parallel, as they frequently are in *C. gracilis*. The occipital lobes distinct, but not more developed than in *gracilis*. Gular-ventral crest well developed, dorsal crest moderate. Body covered with uniform granular scales, indistinguishable on this character from the Sudanese *gracilis* examined. No tarsal process. In even the female *gracilis* from the Sudan there is a slight indication of a spur, and in the males it is well developed at all ages. In the large male selected as type, and in all of the six male paratypes, the spur is less distinct than in female *gracilis*.

The coloration is in every respect similar to that of *gracilis*.

Measurements of the type: Length, 256; body, 137; tail, 119; tail/length, .46; arm, 58; leg, 56; length of head, 40; snout to angle of mouth, 25; angle of mouth to occiput, 25; width of head, 17 mm.

The tail length in the series varies only from .44 to .48 of the total, mean .46 (compare *gracilis* above). The development of the occipital lobes is constant. The lateral crests may be more or less parallel, but with the widest point usually well behind the eyes.

In view of the described and figured variations in the cranial crests of *C. gracilis*, these characters alone are insufficient to distinguish the present species; but the entire absence of the tarsal process in the male appears to be a character of more importance. It will be observed that Boettger (*loc. cit.*) devotes a special paragraph to the discussion of the sex differences in the series before him without mention of the tarsal process; and it is the writer's conviction that this character must have been overlooked. *C. simoni* Boettger (1885, p. 175) has almost exactly the characters of the occipital lobes and cranial crests of the present form, but is described as having a well-developed tarsal spur. Specimens sent by Dr. Boettger himself to the Harvard Museum of Comparative Zoology as *C. simoni* are undoubtedly *gracilis*, but do not agree with the original description of *simoni*.

It is interesting to note that a specimen, apparently also representative of this form, in the Museum of Comparative Zoology bears the note by Dr. Thomas Barbour, dated 1902: "This specimen is not referable to any species mentioned in Boulenger, Cat. Lizards, Brit. Mus., neither *gracilis, dilepis* nor *parvilobus*."

The writer feels some hesitation in thus proposing a new species in this group of chameleons from a relatively well-known locality, and it is earnestly hoped that its relations may be cleared up by a revision of existing Angolan material.

Summary of Measurements

	Sex	No. of Specimens	Extremes	Average
Length	♂	7	124–256	199.7 mm.
	♀	14	118–245	179.8 mm.
Body	♂	7	68–137	106.7 mm.
	♀	14	63–134	97.5 mm.
Tail	♂	7	56–119	93.0 mm.
	♀	14	55–111	81.5 mm.
Tail/Length	♂	7	.44–.47	.46
	♀	14	.44–.48	.455
Arm	♂	7	31–58	46.8 mm.
	♀	14	27–60	42.3 mm.
Leg	♂	7	29–56	46.3 mm.
	♀	14	27–57	42.3 mm.
Head Length	♂	7	21–40	31.8 mm.
	♀	14	19–47	30.7 mm.
Snout to Angle of Mouth	♂	7	15–25	21.1 mm.
	♀	14	13–23	18.8 mm.
Angle of Mouth to Occiput	♂	7	14–25	20.8 mm.
	♀	14	13–25	18.9 mm.
Greatest Width of Head	♂	7	8.5–15	12.5 mm.
	♀	14	9–17	13.3 mm.

"Through the kindness of Dr. Etienne, my attention was called to the chameleons to be found in the bushes on the hills and in the savannah and more rarely the mangrove thickets near Banana. In life the general color is a bright apple green, changing to dark greenish brown and pale yellowish green. The under side is paler and the numerous gular folds and the gular-ventral crest are yellowish or orange and a band from the axilla to the base of the hind limbs always shows lighter mottlings occasionally turning to orange; a series of dark bands or round spots on the body becomes noticeable at times. When irritated these chameleons hiss, puff up the body, open the mouth, and in general behave like most of their relatives. The tail is very prehensile. The food consists of a variety of insects, chiefly grasshoppers, crickets, roaches, and flies; even bees (*Trigona*), however, had been taken. All specimens were caught in July, the height of the dry season, and were in every sense alert, a further proof that chameleons do not estivate in these latitudes" [H. L.].

Chamæleon dilepis (Leach)

Map 20

Chamæleo dilepis Leach, 1819, in Bowdich, Miss. Ashantee, App., p. 493.

Chamæleon dilepis Gray, 1827, Philos. Mag., (2) II, p. 211; 1828, Spicileg. Zool., part 1, p. 2, Pl. ii, figs. 4 and 5. Griffith, 1831, Cuvier's Anim. Kingd., IX, p. 237, Pl. Gray, 1831, Synopsis, p. 53, in Griffith, Cuvier's Anim. Kingd., IX.

Chamæleo dilepis Duméril and Bibron, 1836, Erpétol. Gén., III, p. 225. Gray, 1845, Cat. Lizards, p. 266. Smith, 1849, Ill. Zool. South Africa, III, App., p. 3. Bianconi, 1850, Spec. Zool. Mossamb., p. 7. Duméril, 1852, Arch. Mus. Hist. Nat. Paris, VI, Pl. xxii, fig. 8; 1856, Rev. Mag. Zool., (2) VIII, p. 418; 1861, Arch. Mus. Hist. Nat. Paris, X, p. 173. Peters, 1862, Monatsber. Akad. Wiss., Berlin, p. 15.

Chamæleon dilepis Gray, 1864, Proc. Zool. Soc. London, p. 472.

Chamæleo dilepis Peters, 1877, Monatsber. Akad. Wiss. Berlin, p. 612; 1878, p. 202; 1882, Reise nach Mossambique, III, p. 21.

Chamæleon dilepis Dollo, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 154. Boulenger, 1887, Cat. Lizards, III, p. 450. Boettger, 1888, Ber. Senck. Ges., p. 40. Mocquard, 1888, Mém. Cent. Soc. Philom. Paris, p. 112. Günther, 1892, Proc. Zool. Soc. London, p. 555. Pfeffer, 1892, Jahrb. Hamburg. Wiss. Anst., IX, p. 75. Günther, 1893, Proc. Zool. Soc. London, p. 618. Stejneger, 1893, Proc. U. S. Nat. Mus., XVI, p. 724. Bocage, 1895, Herpétol. Angola, p. 59. Peracca, 1896, Boll. Mus. Torino, XI, No. 255, p. 1. Boulenger, 1897, Proc. Zool. Soc. London, p. 800; 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 278.

Chamæleon dilepis Johnston, 1897 British Centr. Africa, p. 361*a*. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 47. Boulenger, 1900, Proc. Zool. Soc. London, p. 451. Tornier, 1900, Zool. Jahrb. (Syst.), XIII, p. 606; 1901, Beiheft, Arch. Naturg., LXVII, p. 88. Boulenger, 1902, Proc. Zool. Soc. London, II, p. 17; in Johnston, Uganda Protectorate, I, p. 446. Tornier, 1902, Zool. Jahrb. (Syst.), XV, pp. 587 and 676. Werner, 1902, Verh. Zool.-Bot. Ges. Wien, LII, pp. 339 and 343. Boulenger, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 112; 1905, Ann. Mus. Stor. Nat. Genova, (3) II, p. 207; 1907, Proc. Zool. Soc. London, p. 486. Chubb, 1909, Proc. Zool. Soc. London, p. 594. Boulenger, 1910, Ann. South African Mus., V, p. 492. Lönnberg, 1910, in Sjöstedt, Kilimandjaro Meru Exp., I, part 4, p. 10. Meek, 1910, Publ. Field Mus. Zool., VII, p. 414. Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 592. Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 443. Sternfeld, 1911, Sitzber. Ges. Naturf. Freunde Berlin, p. 249; 1911, Mitt. Zool. Mus. Berlin, V, pp. 418 and 420. Sternfeld and Nieden, 1911, Mitt.

Zool. Mus. Berlin, V, p. 385. Werner, 1911, Chamæleontidæ, p. 13. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 247. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 90; 1913, Sitzber. Ges. Naturf. Freunde Berlin, p. 457. Werner, 1913, in Brehm's Tierleben, 4th Ed., V, p. 222, Pl., figs. 3 and 4.

Chamæleo bilobus Kuhl, 1820, Beiträge Kennt. Amph., p. 104.

Chamæleon planiceps Merrem, 1820, Tent. Syst. Amph., p. 162.

Chamæleon petersii Gray, 1864, Proc. Zool. Soc. London, p. 470, fig.

Chamæleo capellii Bocage, 1866, Jorn. Sci. Lisboa, I, p. 59.

Chamæleo dilepis quilensis Bocage, 1866, Jorn Sci. Lisboa, I, p. 59.

Chamæleon dilepis quilensis Werner, 1902, Zool. Jahrb. (Syst.), XV, p. 339; 1910, Denkschr. Med. Naturw. Ges. Jena, XVI, p. 352. Lönnberg, 1911, Svenska Vetensk. Akad. Handl., XLVII, No. 6, p. 18. Werner, 1911, Chamæleontidæ, p. 13. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 248. Werner, 1913, in Brehm's Tierleben, 4th Ed., V, p. 222, Pl.

Chamæleon parvilobus Boulenger, 1887, Cat. Lizards, III, p. 449, Pl. xxxix, fig. 5. Boettger, 1887, Ber. Senck. Ges., p. 152. Boulenger, 1892, in Distant, Naturalist in the Transvaal, p. 174. Fleck, 1894, Ber. Senck. Ges., p. 84. Boettger, 1894, Ber. Senck. Ges., p. 91. Werner, 1896, Jahrb. Ver. Magdeburg, p. 142; 1897, Verh. Zool.-Bot. Ges. Wien, XLVII, p. 402. Schenkel, 1902, Verh. Naturf. Ges. Basel, XIII, p. 193.

Chamæleon dilepis parvilobus Günther, 1892, Proc. Zool. Soc. London, p. 555.

Chamæleon quilensis Bocage, 1895, Herpétol. Angola, p. 60, Pl. viii, fig. 3. Matschie, 1897, Bull. Soc. Philom. Paris, (8) IX, p. 5. Boulenger, 1900, Proc. Zool. Soc. London, p. 451; 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 112; 1907, Proc. Zool. Soc. London, p. 486. Roux, 1907, Zool. Jahrb. (Syst.), XXV, p. 439. Odhner, 1908, Ark. Zool. Stockholm, IV, No. 18, p. 5. Chubb, 1909, Proc. Zool. Soc. London, p. 594. Boulenger, 1910, Ann. S. African Mus., V, p. 492. Sternfeld, 1911, Mitt. Zool. Mus. Berlin, V, p. 409.

Chamæleon isabellinus Günther, 1892, Proc. Zool. Soc. London, p. 556, Pl. xxxiii. Johnston, 1897, British Central Africa, p. 361a.

Chamæleon dilepis isabellinus Werner, 1902, Zool. Jahrb. (Syst.), XV, p. 344; 1911, Chamæleontidæ, p. 13. Lönnberg, 1911, Svenska Vetensk. Akad. Handl., XLVII, No. 6, p. 19.

Chamæleon ruspollii Boettger, 1893, Zool. Anz., XVI, p. 116.

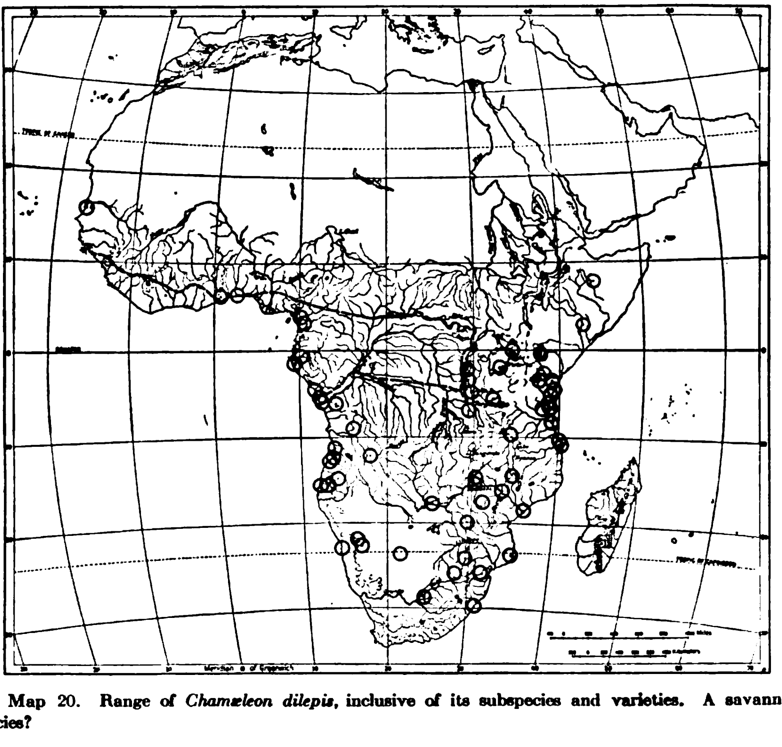
Chamæleon roperi Boulenger, 1890, Proc. Zool. Soc. London, p. 85, Pl. viii, fig. 4. Stejneger, 1893, Proc. U. S. Nat. Mus., XVI, p. 724. Günther, 1894, Proc. Zool. Soc. London, p. 87.

Chamæleon dilepis roperi Tornier, 1901, Beiheft, Arch. Naturg. LXVIII, p. 88. Werner, 1902, Zool. Jahrb. (Syst.), XV, p. 343; 1911, Chamæleontidæ, p. 13. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 247. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 90.

Chamæleon dilepis dilepis Werner, 1902, Zool. Jahrb. (Syst.), XV, p. 340; 1911, Chamæleontidæ, p. 13. Sternfeld, 1912, Sitzber. Ges. Naturf. Freunde Berlin, p. 387; 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 248. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 90.

A single specimen (A. M. N. H. No. 11372) of this species was taken on a bush in the savannah near Malela, June, 1915.

Chamæleon dilepis with its subspecies has a very wide distribution in Africa, perhaps the widest of any chameleon. The distinction of the subspecies *quilensis* appears to be doubtful, and *roperi* and *isabellinus* are not different in range from *dilepis dilepis*. Although the great majority of records for *dilepis* are from the open country of Africa, it is recorded also from localities well within the Rain Forest of Gaboon and Kamerun. The writer is inclined to believe that these indicate an extension of range due to the modification of the habitat by human settlements and plantations. At any rate, the species appears to be absent in the Ituri Forest. Its absence from the entire eastern Sudan is unexplained; and the distribution of the several forms offers an interesting problem.



Map 20. Range of *Chamæleon dilepis*, inclusive of its subspecies and varieties. A savannah species?

The writer has examined the type of *Chamæleon angusticoronatus* Barbour (Mus. Comp. Zool., No. 6712), which, while belonging to the *dilepis* group, appears to be specifically distinct, although *Chamæleon dilepis* has also been recorded from the island of Zanzibar. In the collection of the Harvard

Museum of Comparative Zoology there is also a series of *Chamæleon roperi* Boulenger, (Nos. 11477–11482), in which the males lack the spur of the typical *dilepis*. This character appears to be of greater importance than the other distinctions of *roperi;* and, as the type of *roperi* was spurless, the subsequent identifications of spurred *dilepis* with *roperi* may be fallacious. On this hypothesis *roperi* would be a distinct species bearing the same relation to *dilepis* as the above described *Chamæleon etiennei* to *gracilis*.

Measurements of the Malela Specimen and Two from Rhodesia

A. M. N. H. No.	11372	5843	5867
Sex	♀	♀	♂
Length	223	241	204 mm.
Body	115	125	94 mm.
Tail	108	116	110 mm.
Tail/Length	.48	.48	.54
Arm	49	52	44 mm.
Leg	49	47	42 mm.
Head Length	35	37	32 mm.
Head Breadth	16.5	15	14 mm.
Mouth	22	24	21 mm.
Angle of Mouth to Occiput	23	23	19 mm.
Occ. Lobe at Base	13.5	14	11.3 mm.

Chamæleon senegalensis lævigatus Gray

Plate XXX, Figure 2; Map 21.

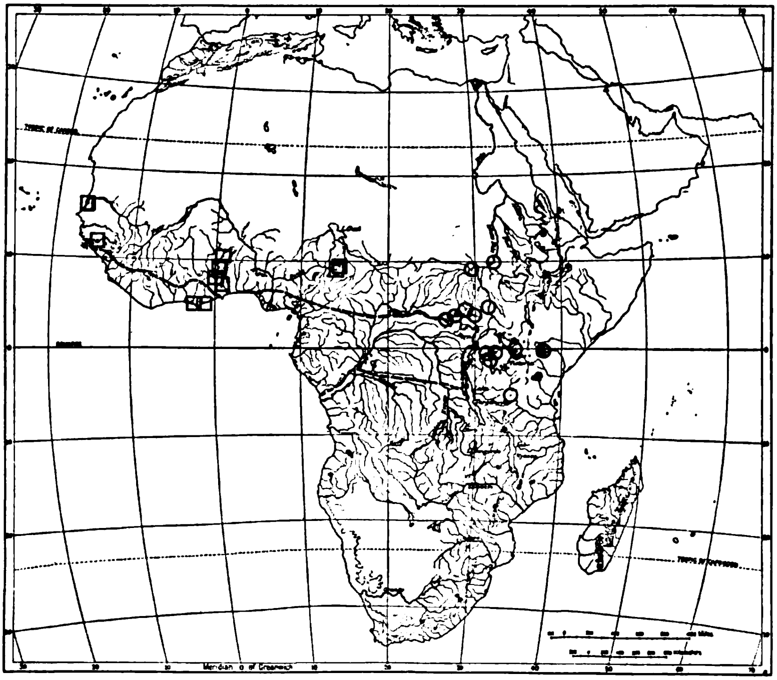
Chamæleon lævigatus Gray, 1863, Proc. Zool. Soc. London, p. 95; 1864, p. 471 Tornier, 1900, Zool. Jahrb. (Syst.), XIII, p. 603; 1902, XV, p. 587. Boulenger, 1902, in Johnston, Uganda Protectorate, p. 446. Werner, 1907, Sitzber. Akad. Wiss. Wien (math.-natur.), CXVI, part 1, p. 1862. Peracca, 1909, in Il Ruwenzori, I, p. 171. Werner, 1911, Chamæleontidæ, p. 18. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp. IV, p. 257. Nieden, 1913, Mitt. Zool. Mus. Berlin, VII, p. 94.

Chamæleon senegalensis lævigatus Günther, 1888, Proc. Zool. Soc. London, p. 50; 1895, Ann. Mag. Nat. Hist., (6) XV, p. 524. Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 55. Boulenger, 1909, Ann. Mus. Stor. Nat. Genova, (3) IV, p. 302. Roux, 1910, Rev. Suisse Zool., XVIII, p. 97.

From the previous discussions of the relations between the fauna of the eastern Sudan and the Senegalese region, the present use of the trinomial for this form appears to be sufficiently justified. Unfortunately, there have been no specimens of *C. senegalensis senegalensis* available for comparison. The nearest record of *lævigatus* is that of Werner in the Lado (1907, p. 1862).

It is of interest that Nieden (1910, p. 239) records *senegalensis* from the Lake Chad region.

Thirty-nine specimens were secured by the present expedition in the upper Uele region. A. M. N. H. Nos. 11392–94 (January–March 1912), 11401–4 (October 1912), 11405–6 (January 1913), are from Faradje; 11398 (March 1912), 11399 (May 1912), 11400 (June 1912), Garamba; 11373–91 (November 1910), Niangara; 11407–11 (August 1913), Poko; 11395–97 (November 1911), Yakuluku.



Map 21. Distribution of *Chamæleon senegalensis*.

□ *Chamæleon senegalensis senegalensis.*

○ *Chamæleon senegalensis lævigatus.*

The series is uniform in most characters. The largest male measures 200 mm., body length 103 mm.; the largest female 218 mm., body 120 mm. The tail length is variable, ranging from .41 to .52 of the total, mean .46. The mean tail length in males is .47, in the females .44 of the total.

The colors are obscure (in formalin material) and the dark lateral lines, regarded as characteristic by Werner (1911, p. 18) are discerned in only a few specimens. The alcoholic specimens in the series may be arranged serially to show progressive color changes.

I.— Uniform dark green, limbs lighter beneath. Ventral crest yellow, light lateral lines scarcely discernible.
II.— Much lighter, greenish gray. Ventral crest yellow.
III.— Light bluish green, darker on the vertebral line, limbs white beneath, ventral crest white. Two distinct light lateral bands, with indications of black pigmentation.
IV.— Uniform gray. Skin between the scales white; limbs gray beneath, ventral line white. Lateral lines distinct, white posteriorly, merging into the gray body color anteriorly.
V.— Ground color light gray, lateral lines white, rest of body spotted all over with darker gray, spots about equalling the interspaces.
VI.— White, no lateral light lines. Irregular isolated black marks on the vertebral line, a smudge of black on each side, elbows and knees black.

A juvenile specimen, apparently just out of the egg, is greenish gray over all, with two light lateral lines distinct.

No. 11401, taken October 4, contained 16 + 20 eggs about 6 mm. in diameter. All other specimens examined in this respect (Nov.–March) contained undeveloped eggs.

The stomachs of Nos. 11375, 11382, and 11388 contained grasshopper remains and parasitic worms which may have been parasites of the grasshoppers; of No. 11392, fragments of millipedes (Julidæ) and various insect remains.

Summary of Measurements

	Sex	No. of Specimens	Extremes	Average
Length	♂	12	155–200	175.0 mm.
	♀	18	170–218	192.1 mm.
	Juv.	9	52–122	102.4 mm.
Body	♂	12	85–106	92.6 mm.
	♀	18	90–120	106.6 mm.
	Juv.	9	27–66	54.4 mm.
Tail	♂	12	70–97	83.2 mm.
	♀	18	73–98	85.5 mm.
	Juv.	9	25–58	48.0 mm.
Tail/Length	♂	12	.45–.52	.475
	♀	18	.41–.49	.44
	Juv.	9	.45–.48	.47
Arm	♂	12	36–45	40.8 mm.
	♀	18	40–51	46.1 mm.
	Juv.	9	12–31	22.5 mm.

	Sex	No. of Specimens	Extremes	Average
Leg	♂	12	35–43	38.6 mm.
	♀	18	39–52	44.3 mm.
	Juv.	9	11–27	21.7 mm.
Head Length	♂	12	22–28	24.2 mm.
	♀	18	24–30	24.2 mm.
	Juv.	9	8.5–19	15.7 mm.
Snout to Angle of Mouth	♂	12	14–18	16.0 mm.
	♀	18	17–21	18.4 mm.
	Juv.	9	6–13	10.4 mm.
Angle of Mouth to Occiput	♂	12	12.5–16.0	13.9 mm.
	♀	18	14.0–19.0	15.7 mm.
	Juv.	9	5–11.5	9.4 mm.
Greatest Width of Head	♂	12	7.5–10.0	8.8 mm.
	♀	18	7.5–11.0	9.4 mm.
	Juv.	9	3.0–8.0	6.0 mm.

"These chameleons may be found everywhere in the savannah; most of those collected were taken from bushes near swamps, watercourses, and plantations. Vegetation is denser during the rainy season and few chameleons are seen then, but in the dry season (January to March), when the bareness of the brush facilitates their discovery, many were gathered, proving that this species does not estivate. They change from dark green to pale yellow and from greenish brown to greenish gray, colors not always in harmony with the surroundings. The series of dark spots, which may form lateral lines, is more definite in life than in the preserved specimens (Plate XXX, Fig. 2)" [H. L.].

Chamæleon owenii (Gray)

Plate XXXI, Figure 1; Plate XXXII, Figure 6; Map 22

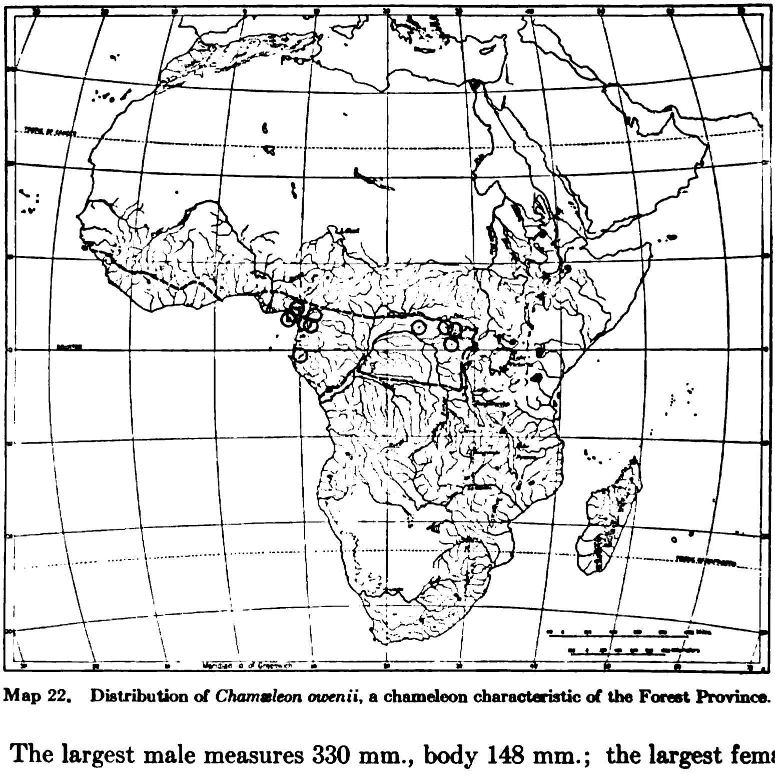
Chamæleo owenii Gray, 1831, in Griffith, Cuvier's Anim. Kingd., IX, Syn., p. 54; [1831, Zool. Misc., p. 7, Pl. iv]; 1845, Cat. Lizards, p. 269. Buchholz, 1874, Monatsber. Akad. Wiss. Berlin, p. 85.

Chamæleon owenii Boulenger, 1887, Cat. Lizards, III, p. 470. Mocquard, 1897, Bull. Soc. Philom. Paris, (8) IX, p. 5. Sjöstedt, 1897, Bihang Svenska Vetensk. Akad. Handl., XXIII, part 4, No. 2, p. 20. Werner, 1899, Verh. Zool.-Bot. Ges. Wien, XLIX, p. 133. Boulenger, 1900, Proc. Zool. Soc. London, p. 451. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 676. Werner, 1902, Zool. Jahrb. (Syst.), XV, p. 405. Johnston, George Grenfell and the Congo, II, p. 950. Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 592. Werner, 1911, Chamæleontidæ, p. 34. Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 259.

Chamæleon owenii cristatus Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 259.
Chamæleon mitchelli Müller, 1913, Zool. Anz., XLI, p. 230.

Thirty specimens in the collection: A. M. N. H. No. 11429 (September 1913) is from Akenge; 11440 (January 1910), Bafwabaka; 11441, Ituri Forest; 11412–21 (April–May 1910), 11422–24 (August 1910), 11425–26 (September 1910), 11427–28 (October 1910), 11430–31 (April 1914), 11432–34 (June 1914), 11435–39 (July 1914), Medje.

This species, hitherto recorded from the Upper Congo region only in the single specimen described as *Chamæleon mitchelli* by Müller (1913, p. 230), is one of the most distinctive of the forms characteristic of the forest area. It has not been recorded west of Kamerun.



Map 22. Distribution of *Chamæleon owenii*, a chameleon characteristic of the Forest Province.

The largest male measures 330 mm., body 148 mm.; the largest female 338 mm., body 144 mm. The tail length varies from .55 to .60 of the total, mean .58, the sexes being scarcely distinguishable in this respect. The longest rostral horn measured is 20 mm., and the preorbital horns usually equal the rostral.

The type of *Chamæleon mitchelli* Müller (1913, p. 230) was taken at Gô, in the Uele district, about two hundred miles west of the area reached by the present expedition, within the limits of the continuous forest. It is differentiated from *Chamæleon owenii* in the following points: (1) legs somewhat longer and stouter; (2) occipital lobes larger and more widely separate; (3) dorsal scales somewhat larger and slightly enlarged scales scattered on the limbs; (4) diameter of orbit nearly equalling its distance from snout to occiput; (5) lateral and parietal crests more strongly developed; lateral crests rising from the orbits at an angle with the direction of the mouth (parallel with it behind the orbits in *owenii*); lateral crests converging from the orbits, parallel or divergent anteriorly in *owenii;* and (6) interorbital region more deeply concave.

Three male *owenii* from Kamerun in the collection of The American Museum of Natural History, and another from Kribi, loaned by the Museum of Zoology of the University of Michigan, have been available for comparison with the Ituri series.

The measurements show that the limbs are of approximately the same length, the figures for the West African specimens falling within the limits of variation of the eastern series.

The development of the occipital lobes is highly variable in the Ituri series; they may be separated by only a very shallow notch or by a deep nearly square emargination; and again, the lobes of the specimens from Gaboon are between the extremes in the larger series.

Sternfeld (1912, p. 259) has shown that *owenii* has slightly heterogeneous scales, and has, in fact, named a new variety to represent the extreme development in this direction. The three Gaboon specimens examined exhibit this characteristic which is about as well developed in the Ituri specimens.

The diameter of the orbit proves to be of relatively the same size in eastern and western specimens.

The lateral and parietal crests are developed to about a similar extent in both series, the parietal crest being especially variable. The convergence of the lateral crests, viewed from above, is as described for *mitchelli,* and the angle with the direction of the mouth also appears more pronounced.

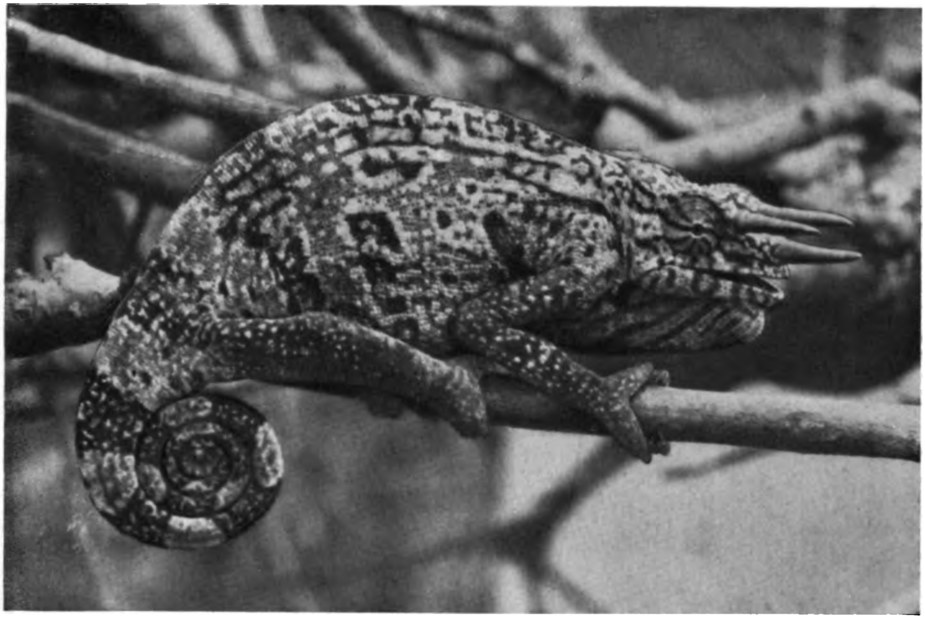
Finally, the interorbital region is more deeply concave and narrower in the eastern specimens, although subject to considerable variation.

Passing over minor distinctions, which also prove untenable (scales of temporal region, enlarged supralabials, etc.), it will be observed that the validity of *mitchelli* rests on the slender basis of two comparative characters, the convergence and slope of the lateral crests and the concavity of the interorbital region. These differences appear so slight to the present writer

Plate XXXI

Figure 1. *Chamæleon owenii* Gray. A. M. N. H. No. 11425; ♂; **length 303 mm.**

Figure 2. *Chamæleon iturensis*, new species. A. M. N. H. No. 11494; ♀; **length 213 mm.**



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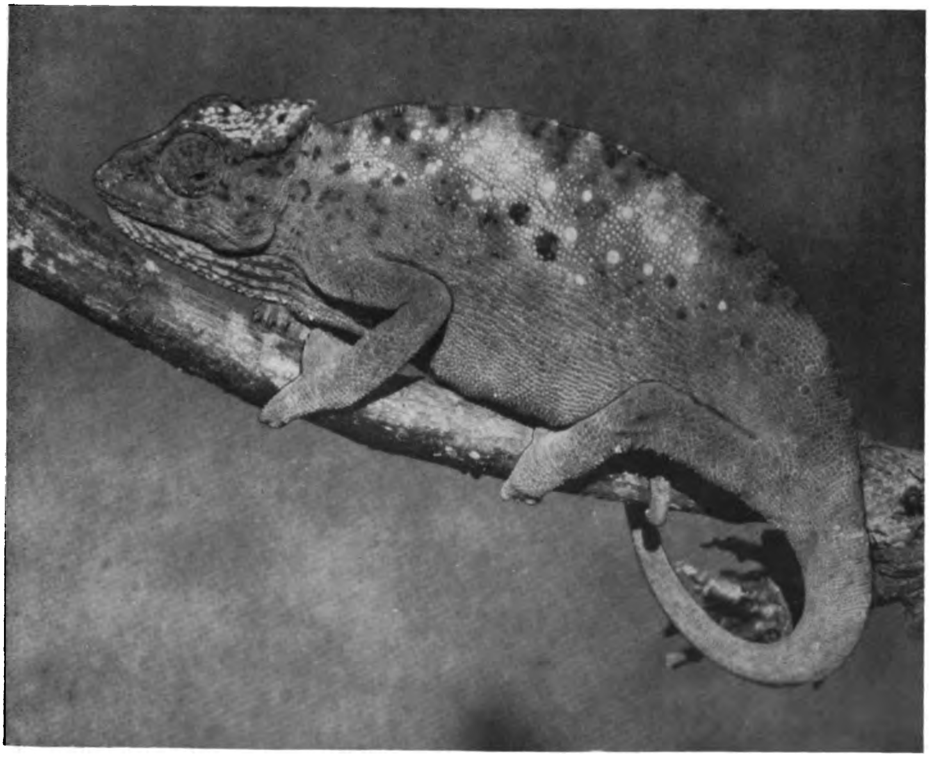

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that, pending the examination of a larger series of West African *owenii*, *mitchelli* is placed in the synonymy. The relation would be so close that intergradation may be postulated, making *mitchelli*, at most, an eastern subspecies.

Chamæleon owenii cristatus Sternfeld (*loc. cit.*) is not geographically distinct and, in the writer's opinion, is invalid. In any case, the subspecific name *cristatus* is preoccupied by *C. cristatus* Stutchbury.

The ovaries of No. 11412 had undeveloped eggs; of No. 11413, 7 + 8 eggs, 20 × 11 mm.; of No. 11429, 8 + 9 eggs, 18 × 10 mm.

The stomach of No. 11429 contained a cockroach and three millipedes (Julidæ).

Summary of Measurements

	Sex	No. of Specimens	Extremes	Average
Length	♂	13	250–330	293.1 mm.
	♀	15	235–338	307.0 mm.
Body	♂	13	110–148	125.3 mm.
	♀	15	99–144	130.4 mm.
Tail	♂	12	138–186	171.2 mm.
	♀	15	136–197	176.5 mm.
Tail/Length	♂	12	.55–.60	.58
	♀	15	.55–.60	.57
Arm	♂	13	48–58	53.3 mm.
	♀	15	42–60	55.1 mm.
Leg	♂	13	44–59	52.6 mm.
	♀	15	43–61	55.3 mm.
Head Length	♂	13	29–37	32.8 mm.
	♀	15	27–37	34.1 mm.
Snout to Angle of Mouth	♂	13	20–25	22.3 mm.
	♀	15	18.5–25	23.5 mm.
Angle of Mouth to Occiput	♂	13	18–23	20.5 mm.
	♀	15	16.5–23	21.2 mm.
Orbital Width	♂	13	10–12.5	11.0 mm.
	♀	15	9–13	11.5 mm.
Greatest Width of Head	♂	13	12–17	14.4 mm.
	♀	15	12–17	15.6 mm.

On Plate XXXII, Fig. 6, is reproduced an excellent water-color of this species, as made in the field by Mr. J. P. Chapin.

"The variety of color phases is greater than in other species which we met. These changes are not instantaneous but progressive, however rapid the transformation, and during all of them the creatures show the large, irregular, interrupted, black cross-bars, four on each side of the body, the last above the anal region. Green in all shades, brown, white, and yellow are the predominating colors; great excitement causes mottlings of bright reddish brown to appear. There is a more or less distinct light mid-ventral line and about ten dark longitudinal lines on the throat, corresponding to the gular folds. The limbs are usually darker than the general color, green or strongly mottled with black. The spherical eyelid is always more brilliantly colored above, green or yellow; white or gray below, with radiating brown lines which are reddish above. The upper surface of the head is reddish brown. Iris golden, but scarcely visible. As in other species, the eyeballs are turned backward and forward or up and down quite independently of each other.

"The three horns of the male, two in front of the eyes and one projecting still further from the nose are quite striking, although the females show no trace of such adornment. The total length of this species, often as much as 13 inches in both sexes, makes it by far the largest species we saw in the Rain Forest; the typical color pattern, excitable nature, and relative swiftness of movements are equally noticeable distinctions. They jump from branch to branch, chiefly downward, with considerable accuracy, for as much as two feet. They spring to the ground from any height, usually land on their feet, and walk off rapidly with tail straight in the air or spirally coiled. *C. owenii* moves with ease on either the upper or lower surface of tiny twigs. It sits motionless for hours in the shade, often anchored to a twig by the tail, which is very prehensile and so strong that the tip alone is sufficient to support the animal. Dangling in this way they may swing to another twig or bend the body forward and clamber up on the tail to the supporting branch.

"Our captives often moved close to skeletons laid in the sun to dry and fed on the flies, butterflies, beetles and bees swarming thereon; the tongue was then shot out more than a foot at the selected prey, always with unfailing accuracy. Stomach contents showed that grasshoppers, roaches and millipeds were also taken; in three instances bits of leaves had been swallowed, probably by accident in anger. When held in the hand they usually hiss hoarsely, inflating the body until the skin appears stretched to the utmost, and with surprising rapidity and quite unexpectedly snap at one's finger, biting with force. When taken behind the neck they lash the tail and scratch one's hand with their little claws.

"These chameleons are not rare and occur for the most part in bushes along forest paths and in the second growth of deserted plantations. Far from seeking concealment by remaining still when approached by the natives, they hiss and actually jump from a branch in a rage. The Mangbetu, Medje, Makere, and some of the Azande believe this to be an omen announcing sudden death; part of the smoked and burned body is worn as a talisman, warding off immediate calamity, though all agree that a man warned thus will never reach old age. No native would ever touch one, preferring to use a rod and noose, which is passed over the head and keeps the animal at a safe distance. Others are warned not to approach at such a time, as it would be a grave offense if the chameleon should happen to hiss at anyone" [H. L.].

Chamæleon ituriensis, new species

Plate XXXI, Figure 2; Plate XXXII, Figures 1 to 5

?Chamæleon johnstoni affinis STERNFELD, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 262, Pl. VII, fig. 3.

The common chameleon of the Ituri region, apparently an undescribed species, is represented in the collection by ninety-nine specimens, eighty-four females and fifteen males: A. M. N. H. No. 11540 (March 1914) is from Avakubi; 11442 (September 1909), Batama; 11445–70 (February 1910) Gamangui; 11443–44 (January 1910), 11471–80 (April 1910), 11481–83 (August 1910), 11484–93 (September 1910), 11494–508 (April 1914), 11509–22 (June 1914), 11523–39 (July 1914), Medje.

Diagnostic characters

Habitus rather slender, tail slightly shorter than the body or equal in length. Casque somewhat elevated behind, parietal crest distinct. Lateral crests strong. Occipital lobes indicated. No dorsal, gular, or ventral crest. Dorsum compressed, wavy in outline. Squamation heterogeneous. A mid-ventral light line.

Detailed description

Type: No. 11490.

Habitus moderately slender, tail .51 of the total length. Length of mouth exceeds the distance from its angle to the occiput. Casque considerably narrowed at the orbits.

Casque sharply angular, canthus distinct. Orbits raised, their diameter equaling the distance from their anterior border to the snout, slightly less than from their posterior border to the occiput. Lateral crest horizontal or slightly descending behind the orbit, then rising abruptly to meet its fellow. Parietal crest well developed, short, reaching forward as far as the posterior border of the orbits. Temporal crest slightly developed. Occipital lobes indicated, immovable.

No dorsal crest. Vertebral line more or less compressed, wavy in outline from the side, with a row of undifferentiated flat scales on each side. No gular or ventral crest. Median gular scales much smaller than the ventral. Enlarged conical tubercles at intervals along the gular folds.

Squamation heterogeneous, the enlarged flat scales arranged in irregular longitudinal lines, equaling in diameter two or three of the smaller scales. Latter flat on back and sides, convex ventrally.

No tarsal spur. No preorbital or nasal horn. An enlarged subconical tubercle on the juncture of the *canthi rostrales*, no trace before the orbits.

Coloration of formalin specimens is uniform dark gray with a mid-ventral light line beginning between the arms and continuing to the anus, two scales wide. The coloration in life has been beautifully illustrated in Mr. Chapin's series of color sketches made in the field to show the range of color change (Pl. XXXII).

Measurements of the type: length, 181; body, 89; tail, 92; tail/length, .50; arm, 36; leg, 36; length of head, 26; snout to angle of mouth, 18; angle of mouth to occiput, 15; width of casque at eyes, 9; greatest width of casque, 11 mm.

The males are much smaller than the females, which may in part account for the great preponderance of females in the series (eighty-four out of ninety-nine). The largest male measures 185 mm.; body 94 mm.; the largest female 248 mm., body 122 mm. The tail length varies from .44 to .53 of the total, mean in the females .49, in the males .50.

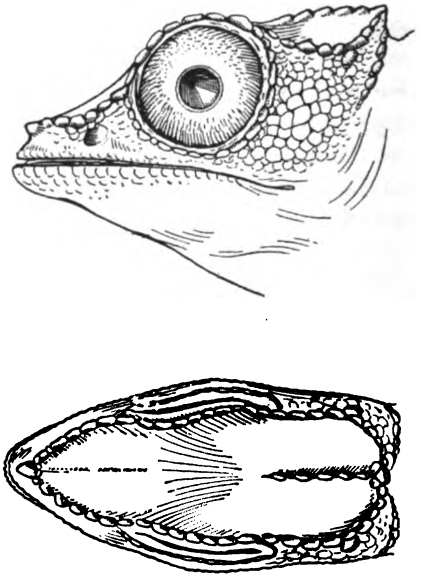


Fig. 25. Head of *Chamæleon ituriensis*, (type, 11490 × 2).

The temporal crest is more or less distinct. The condition of the specimens has much to do with the distinctness of the rudimentary occipital lobes, which are entirely invisible in shrunken specimens. The area on each side of the parietal crest (above the supratemporal fossa) appears to be normally convex but is plane or concave in many specimens, also probably due to conditions of preservation. The enlarged tubercle on the snout is frequently double instead of single, often scarcely discernible, and is equally developed in both sexes.

It is with considerable hesitation and only tentatively that Sternfeld's subspecies *affinis* of *C. johnstoni* (1912, p. 262, Pl. VII, fig. 3) is referred to the present form. Of his specimens, the large female figured came from the forest northwest of Lake Tanganyika, while the juvenile male came from the Irumu-Mawambi forest, i. e., from the Ituri region. In the figure, the female specimen appears to be much stouter; the limbs appear to be thicker than in the form here described; and the canthus rostralis does not correspond in outline; the posterior part of the casque is similar, but the orbit is less raised.

Whatever the affinities of the female, there seems to be considerable probability that the young male from the Ituri (included under the same head) belongs in reality to *C. ituriensis*, the most abundant Ituri chameleon, and it is indistinguishable from Sternfeld's brief description. Reference to Boulenger's figure of *C. johnstoni* shows that the present form is not closely related. A male specimen of *johnstoni* in the Harvard Museum of Comparative Zoology (No. 7257), no larger than the males of the present series, has well-developed horns. It may be remarked that the subspecific name *affinis* is preoccupied by *C. affinis* Rüppell.

Chamæleon camerunensis Müller is the only West African form with which *ituriensis* may be compared. The present form is at once distinguished by its stouter habitus, higher casque, shorter tail, and less serrated vertebral line. (Müller, 1910, Abh. Bayerischen Akad. Wiss., 2 Kl., XXIV, p. 592, Pl. I, fig. 5). *C. camerunensis* lacks the parietal crest, the indications of occipital lobes, and the nasal tubercle.

Without material for comparison, it is impossible for the writer to draw any conclusion as to the relationships of the present species. It appears equally distinct from *C. johnstoni* to the east and *C. camerunensis* to the west, and must stand for the present as a form characteristic of the Ituri region.

The stomachs contained a snail (No. 11520), a spider and several crickets (No. 11446), a mantid and nymphs of Hemiptera (No. 11520), muscid flies of the genus *Pycnosoma* and various worker ants (No. 11468), and two species of ichneumons (No. 11520).

Summary of Measurements

	Sex	No. of Specimens	Extremes	Average
Length	♂	15	125–189	165.6 mm.
	♀	84	154–248	207.3 mm.
Body	♂	15	64–94	83.2 mm.
	♀	84	80–130	106.4 mm.
Tail	♂	15	61–95	82.4 mm.
	♀	84	74–126	101.8 mm.
Tail/Length	♂	14	.48–.51	.498
	♀	84	.44–.53	.488
Arm	♂	15	27–42	34.6 mm.
	♀	84	34–50	43.1 mm.
Leg	♂	15	28–40	34.1 mm.
	♀	84	32–53	43.0 mm.
Head Length	♂	15	18–28	23.9 mm.
	♀	84	23–35	29.6 mm.
Snout to Angle of Mouth	♂	15	13–18	16.4 mm.
	♀	84	16–24	20.5 mm.
Angle of Mouth to Occiput	♂	15	10.5–16.0	14.4 mm.
	♀	84	14.0–21.0	18.2 mm.
Orbital Width	♂	15	6.0–10.0	8.6 mm.
	♀	84	7.0–12.0	9.7 mm.
Greatest Width of Head	♂	15	8.5–12.0	10.6 mm.
	♀	84	10.0–16.5	13.4 mm.

"The general color in life is dark brownish green above, changing with its moods or to match the environment to light brown, grayish green and pale yellowish green. In the darkest and lightest phases the dusky markings on the head and the darker pattern on body and tail completely fade, but the rows of light round spots on the body persist in all color phases, though varying in distinctness (Plate XXXII, Figs. 1 to 5). The wrinkled skin around the eyes is usually somewhat lighter than the general color. No red or blue colors are observed in this species. When killed in a cyanide jar they become a light bronze-green.

"In the forest this species is more common than the discovery of a specimen here and there would indicate. Occasionally one is seen creeping along a pathway; but during the day they perch on tiny twigs in the lower bushes and are made out only with difficulty in the maze of green foliage. We never saw one jump from twig to twig, and, on the whole, they are much slower in movement and of a less excitable temper than *C. owenii,* yet their manner of progressing is the same, the tail being equally prehensile. Although they do not hiss, they are greatly feared by the superstitious natives" [H. L.].

Chamæleon adolfi-friderici Sternfeld

Text Figure 26

Chamæleon adolfi-friderici Sternfeld, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 258.

This small species, described from the Ituri Forest, is represented in the present collection by four specimens, a male and three females. Having been described originally from a single female specimen, a more complete definition of the species is now possible. A. M. N. H. Nos. 11541–42 (March 1910), 11543 (April 1910), 11544 (June 1914) are from Medje.

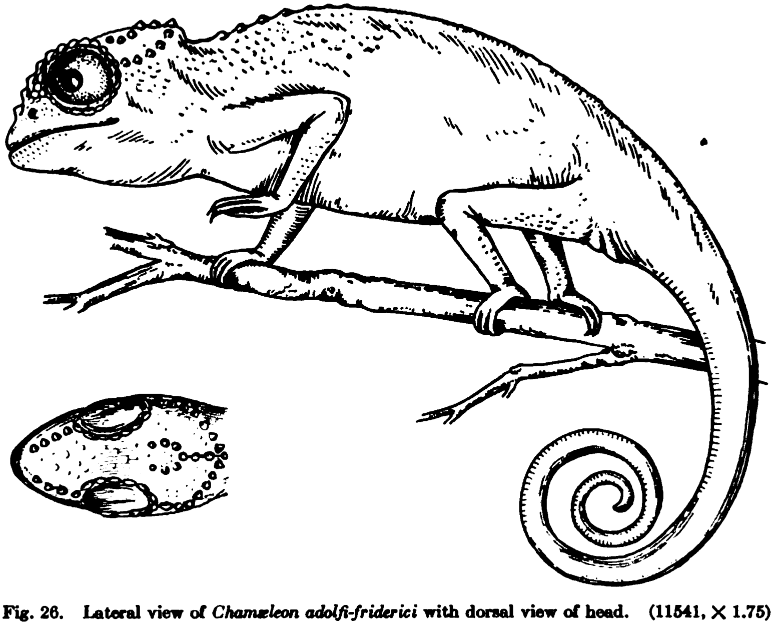


Fig. 26. Lateral view of *Chamæleon adolfi-friderici* with dorsal view of head. (11541, × 1.75).

The chief characteristics, from the original description, are absence of dorsal, gular, and ventral crests; homogeneous squamation; temporal crests convergent, uniting; parietal crest of isolated pointed tubercles; enlarged conic scales on the canthus rostralis; and small size.

The scales of the body, while not heterogeneous as in *C. bitæniatus*, for example, consist of scales of varying size, smaller and larger usually grouped together. The dorsal crest is discernible only by the closest attention in one of the specimens, but is very evident in the male, consisting of isolated low-conic tubercles, five to ten in number, on the anterior third of the dorsum. The temporal crests rise obliquely from the orbit in one specimen (as described in the type), but in the others run horizontally for three mm. before rising and converging, consisting of six rather large conic scales on each side. The parietal crest consists of pointed tubercles, the anterior isolated and in pairs, i. e., parietal crest forked; three tubercles in the main line and one or two in each of the forks. The conical scales on the canthus rostralis are equally developed in the male and female.

The largest specimen measures 134 mm., with a body length of 57 mm. The tail length varies from .54 to .57 of the total, .53 in the type.

The species was not distinguished in the field from juvenile *C. ituriensis*, and the color of the formalin specimens, which is uniform gray, light gray in one specimen, very dark gray in the remaining three, affords no information as to the coloration in life.

The eggs of the largest female are well developed, three in number.

Measurements

A. M. N. H. No.	11541	11542	11543	11544	TYPE (BERLIN)
Sex	♂	♀	♀	♀	♀
Length	131	112	132	134	116 mm.
Body	56	51	57	57	54 mm.
Tail	75	61	75	77	62 mm.
Tail/Length	.57	.54	.57	.57	.53
Arm	23	21	24	24 mm.	
Leg	21	21	22	23 mm.	
Head Length	15.5	15	15	16 mm.	
Mouth	10.5	10.5	12	11 mm.	
Angle of Mouth to Occiput	10	9	10	10 mm.	
Breadth at Orbit	5	5	6	5 mm.	
Greatest Breadth	9	7	9	9 mm.	

"In the field we considered this species the young of *C. ituriensis*. Through interest in the breeding habits of chameleons we offered a high reward to any native who could show us either a nesting place or the very young. The relatively few specimens of *C. adolfi-friderici* secured prove how scarce the species must be. The natives assured us, however, that chameleons deposit their eggs in the humus under moldering logs or in the hollows of decaying trees" [H. L.].

Rhampholeon Günther

Rhampholeon boulengeri Steindachner

Plate XXX, Figure 3; Plate XXXII, Figures 7 and 8

Rhampholeon boulengeri STEINDACHNER, 1911, Anz. Akad. Wiss. Wien, No. 10, p. 178. WERNER, 1911, Chamæleontidæ, p. 46. STERNFELD, 1912, Wiss. Ergeb. Deutsch. Zentr. Afrika Exp., IV, p. 262, Pl. VII, fig. 4. NIEDEN, 1913, Mitt. Zool. Mus. Berlin, VII, p. 99.

Rhampholeon boulengeri is the common representative of the genus in the Ituri Forest. It had already been recorded from the border of the Rain Forest by Sternfeld (1912, p. 262) but has hitherto been known chiefly from the lake region. The present collection contains sixty-three specimens, all, curiously, females: A. M. N. H. Nos. 11545–71 (April-May 1910), 11572–73 (September 1910), 11576 (April 1914), 11577–93, 11607 (June 1914), 11594–606 (July 1914) are from Medje; 11574–75 (August 1913), Poko.

The species is closely related to *R. spectrum* of the western forest region. The spinose scales of the plantar surfaces are often distally enlarged, an approach to the condition in *spectrum*, which is probably to be derived from an East African parent stock by the way of *boulengeri*.

The largest of the present series reaches a length of 79 mm., tail length 17 mm. The average, excluding three obviously immature specimens, is 70 mm. The tail length varies from .17 to .25 of the total, mean .20. Boulenger (1887, Cat. Lizards, III, p. 476) and Werner (1911, p. 46) record 75 mm. and 18 mm. tail length in females of *spectrum*, while a female in The American Museum of Natural History measures 77 mm. with a tail length of 21 mm. Although the difference in this respect is relatively slight, it appears that *R. spectrum* is a larger species with a longer tail. It will be observed that Sternfeld's series of nine specimens from the lake region differs strikingly in size from the present specimens. He records a range in size in the males from 57.5 to 63 mm., in the females from 50 to 61 mm., and evidently was dealing with mature individuals. It is not improbable that further study may make it possible to differentiate the Ituri form from that of the lake region, possibly as a subspecies.

The rostral appendage varies in length from .4 to 1.3 mm., 2 to 2.3 in *R. spectrum*.

The field notes record the coloration as usually dark or light brown, occasionally changing to ashy gray, but invariably with two oblique black cross-bands on each side.

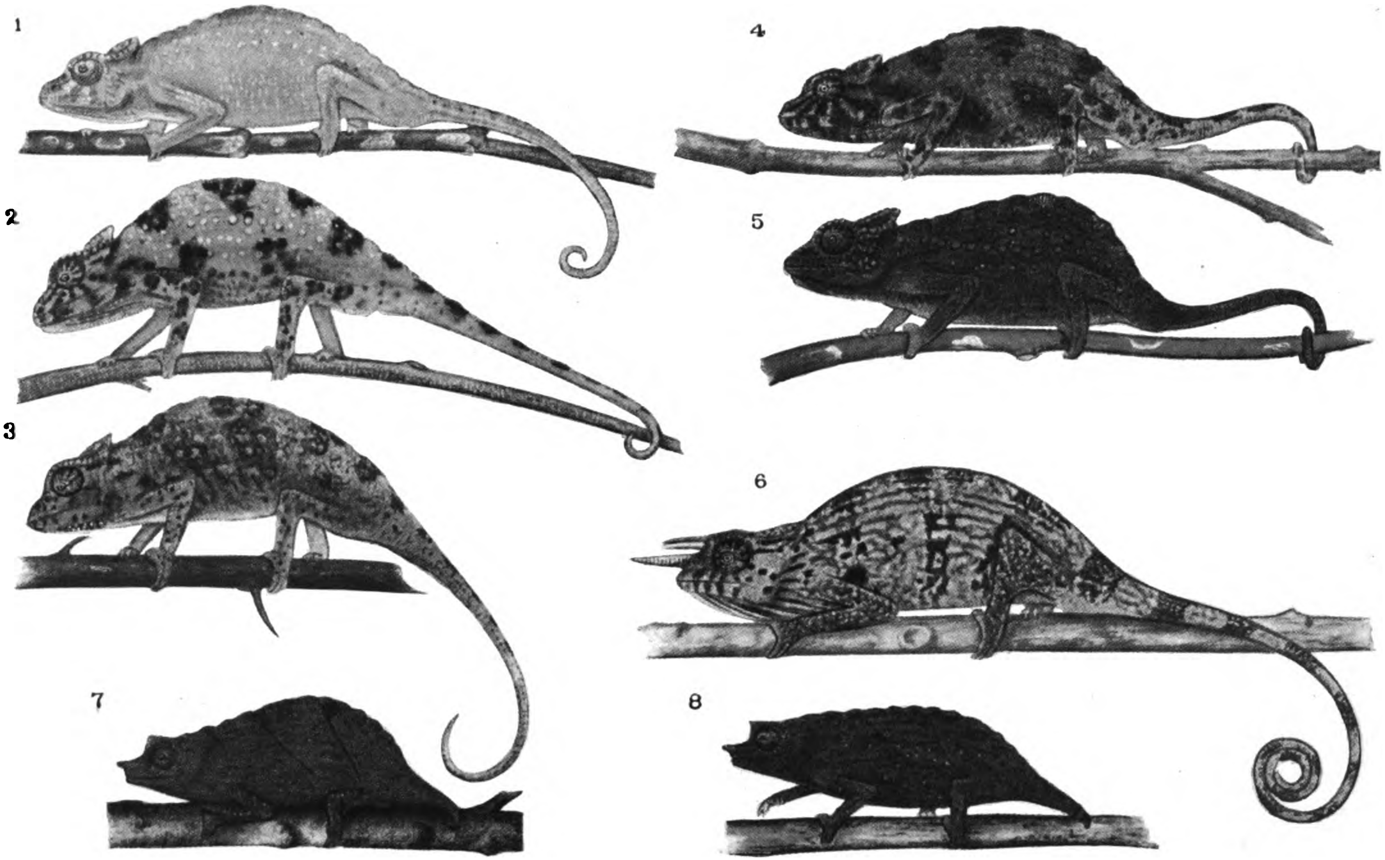
The ovaries observed in American Museum specimens contained eggs as

PLATE XXXII

Figures 1–5. Successively darker color phases in *Chamæleon ituriensis*, new species. A. M. N. H. Nos. 11521–22; length 196 and 234 mm.

Figure 6. *Chamæleon owenii* Gray. A. M. N. H. No. 11439; ♂; length 250 mm. The color usually assumed in bright sunlight.

Figures 7–8. Two color phases of *Rhampholeon boulengeri* Steindachner. A. M. N. H. No. 11607; ♀; length 65 mm.



Figures 1-5. Successively darker color phases in *Chamæleon iturienʂis* Schmidt

Figure 6. *Chamæleon owenii* Gray

Figures 7-8. Extremes of color change in *Rhampholeon boulengeri* Steindachner

follows. Captured during April and May: No. 11545, 1 + 1 eggs, 4 mm.; No. 11547, 1 + 1 eggs, 5 mm.; No. 11548, 1 + 0 eggs, 13 × 8.2 mm., uniform oblong-oval, striate. Captured during June and July: No. 11582, 1 + 1 eggs, 6 mm.; No. 11593, 1 + 1 eggs, 7 mm.; No. 11605, 1 + 1 eggs, 12 × 7 mm, Captured September: No. 11573, 2 + 1 eggs, 12 × 7 mm.

The stomachs contained spiders (No. 11601), nymphal cockroaches (Nos. 11593 and 11601), a nymphal cricket (No. 11568), a grasshopper (No. 11591), a heteropteron (No. 11594), and caterpillars (No. 11568).

Summary of Measurements

	Sex	No. of Specimens	Extremes	Average
Length	♀	63	46–79	69.3 mm.
Body	♀	63	37–62	55.2 mm.
Tail	♀	63	9–17	14.0 mm.
Tail/Length	♀	63	.17–.25	.20
Arm	♀	63	15–24	21.6 mm.
Leg	♀	63	15–24	21.6 mm.
Head Length	♀	63	12–18	16.2 mm.
Snout to Angle of Mouth	♀	63	7.5–11.0	10.3 mm.
Angle of Mouth to Occiput	♀	63	8–12	10. 8 mm.

"The dwarfed appearance of the tiny, stump-tailed forest chameleons, which seldom become more than 3 inches in length, at once distinguishes them from other species. They would hardly be so well represented in our collection were it not for their liking for sunny clearings, especially plantations, where the natives cannot fail to find them when working. With color phases restricted to changes from dark greenish brown to reddish brown and pale gray (Plate XXXII, Figs. 7 and 8; Plate XXX, Fig. 3), their adaptability to the environment at first appears to be more limited than that of other forms observed. Yet when sitting or climbing on branches, dry banana leaves, logs and even the ground, they are indistinguishable from their surroundings. In forest regions, where leaves of all sizes and shapes attract little attention, the strongly curved, irregular outline of the back, the dull shriveled skin with the two peculiar dark markings suggesting the venation of a leaf, make the simulation perfect in every color phase. At the slightest noise they usually stop in any position, even with one front and one hind leg lifted, and may remain motionless for hours. The short tail, although of slight use, is often bent to secure purchase on any available roughness. When annoyed they do not hiss but inflate themselves considerably and feign death. Their food consists of a great variety of insects; spiders and caterpillars are occasionally taken" [H. L.].

APPENDIX A.—LISTS OF THE TURTLES, CROCODILES, LIZARDS, AND CHAMELEONS

THE RAIN FOREST

Testudinidæ

1. *Kinixys erosa* (Schweigger)
2. *Kinixys homeana* Bell

Pelomedusidæ

3. *Pelusios derbianus* (Gray)
4. *Pelusios niger* (Duméril and Bibron)
5. *Pelusios gabonensis* (A. Duméril)

*6. *Pelomedusa galeata* (Schoepff)[1]

Trionychidæ

7. *Amyda triunguis* (Forskål)
8. *Cycloderma aubryi* (A. Duméril)

Crocodylidæ

9. *Crocodylus cataphractus* Cuvier
10. *Crocodylus niloticus* Laurenti
11. *Osteolæmus tetraspis* Cope
12. *Osteoblepharon osborni*, new species

Geckonidæ

*13. *Stenodactylus elegans* Fitzinger

14. *Gonatodes dickersoni*, new species
15. *Ancylodactylus spinicollis* L. Müller

*16. *Phyllodactylus porphyreus* (Daudin)

17. *Diplodactylus palmatus* (Mocquard)
18. *Diplodactylus weileri* L. Müller

*19. *Hemidactylus mabouia* (Moreau de Jonnès)

20. *Hemidactylus ansorgii* Boulenger
21. *Hemidactylus muriceus* Peters
22. *Hemidactylus steindachneri* Tornier

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[1] Species marked with asterisk are regarded as accidental in the forest, as importations, or as invaders, characteristic of a different province.

*23. *Hemidactylus brookii* Gray
24. *Hemidactylus echinus* O'Shaughnessy
25. *Hemidactylus fasciatus* Gray
26. *Hemidactylus ituriensis,* new species
27. *Hemidactylus richardsoni* (Gray)
*28. *Lygodactylus capensis* (Smith)
29. *Lygodactylus fischeri* Boulenger
30. *Lygodactylus conraui* Tornier
31. *Lygodactylus depressus,* new species

Agamidæ

*32. *Agama colonorum* Daudin
33. *Agama mehelyi* Tornier
*34. *Agama atricollis* Smith

Varanidæ

35. *Varanus niloticus* (Linnæus)

Amphisbænidæ

36. *Amphisbæna bifrontalis* Boulenger
37. *Amphisbæna liberiensis* Strauch
38. *Amphisbæna haugi* Mocquard
39. *Chirindia schæferi* Sternfeld
40. *Anopsibæna africanus* (Gray)
41. *Monopeltis boveei* Mocquard
42. *Monopeltis galeata* (Hallowell)
43. *Monopeltis jugularis* Peters
44. *Monopeltis koppenfelsii* (Strauch)
45. *Monopeltis magnipartita* Peters
46. *Monopeltis unirostralis* Mocquard

Lacertidæ

47. *Poromera fordi* (Hallowell)
48. *Lacerta echinata* Cope
49. *Lacerta langi,* new species
50. *Lacerta vaueresellі* Tornier
51. *Bedriagaia tropidopholis* Boulenger
52. *Algiroides africanus* Boulenger
*53. *Eremias guineensis* Boulenger
54. *Holaspis guentheri* Gray

Scincidæ

55. *Mabuya maculilabris* (Gray)
56. *Mabuya polytropis* Boulenger
57. *Mabuya raddoni* (Gray)
58. *Mabuya bensonii* (Peters)
59. *Lygosoma reichenowii* Peters
60. *Lygosoma vigintiserierum* Sjöstedt
61. *Lygosoma gemmiventris* Sjöstedt
62. *Lygosoma rohdei* L. Müller
63. *Lygosoma breviceps* (Peters)
64. *Lygosoma fernandi* (Burton)
65. *Melanoseps occidentalis* (Peters)

Anelytropidæ

66. *Feylinia elegans* (Hallowell)
67. *Feylinia currori* Gray

Chamæleontidæ

*68. *Chamæleon gracilis* (Hallowell)
*69. *Chamæleon dilepis* (Leach)
70. *Chamæleon adolfi-friderici* Sternfeld
71. *Chamæleon owenii* (Gray)
72. *Chamæleon unicornis* Mocquard
73. *Chamæleon quadricornis* Tornier
74. *Chamæleon pfefferi* Tornier
75. *Chamæleon montium* (Buchholz)
76. *Chamæleon cristatus* Stutchbury
77. *Chamæleon wiedersheimi* Nieden
78. *Chamæleon ituriensis*, new species
79. *Chamæleon camerunensis* L. Müller
80. *Rhampholeon spectrum* Buchholz
81. *Rhampholeon boulengeri* Steindachner

The Sudanese Subprovince[1]

Testudinidæ

1. *Kinixys belliana* Gray
2. *Testudo calcarata* Schneider
3. *Testudo pardalis* Bell

Pelomedusidæ

4. *Pelusios adansonii* (Schweigger)
5. *Pelusios derbianus* (Gray)
6. *Pelusios niger* (Duméril and Bibron)

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[1] Khartum, Sennar, White Nile, Lake Chad, Togo, and Senegal.

7. *Pelusios nigricans* (Donndorff)
8. *Pelomedusa galeata* (Schœpff)

Trionychidæ

9. *Cyclanorbis elegans* (Gray)
10. *Cyclanorbis oligotylus* Siebenrock
11. *Cyclanorbis senegalensis* (Duméril and Bibron)
12. *Amyda triunguis* (Forskål)

Crocodylidæ

13. *Crocodylus cataphractus* Cuvier
14. *Crocodylus niloticus* Laurenti
15. *Osteolæmus tetraspis* Cope

Geckonidæ

16. *Stenodactylus elegans mauritanica* Guichenot
17. *Tropiocolotes steudneri* (Peters)
18. *Gymnodactylus kotschyi* Steindachner
19. *Pristurus flavipunctatus* Rüppell
20. *Ptyodactylus hasselquisti togoensis* Tornier
21. *Hemidactylus mabouia* (Moreau de Jonnès)
22. *Hemidactylus brookii* Gray
23. *Hemidactylus stellatus* Boulenger
24. *Hemidactylus fasciatus* Gray
25. *Hemidactylus tropidolepis* (Mocquard)
26. *Bunocnemis matschiei* Tornier
27. *Lygodactylus picturatus gutturalis* (Bocage)
28. *Tarentola annularis* (Geoffroy)
29. *Tarentola senegalensis* Boulenger
30. *Tarentola ephippiata* O'Shaughnessy
31. *Tarentola delalandii* (Duméril and Bibron)

Eublepharidæ

32. *Hemitheconyx caudicinctus* (A. Duméril)

Agamidæ

33. *Agama pallida* Reuss
34. *Agama colonorum* Daudin
35. *Agama bibroni* A. Duméril
36. *Agama boulengeri* Lataste

Varanidæ

37. *Varanus griseus* (Daudin)
38. *Varanus exanthematicus exanthematicus* (Bosc)
39. *Varanus exanthematicus ocellatus* Rüppell
40. *Varanus niloticus* (Linnæus)

Amphisbænidæ

41. *Amphisbœna kraussi* Peters
42. *Amphisbœna leonina* F. Müller
43. *Amphisbœna leucura* Duméril and Bibron
44. *Amphisbœna mülleri* Strauch
45. *Amphisbœna oligopholis* Boulenger
46. *Placogaster feæ* Boulenger

Lacertidæ

47. *Latastia longicaudata* (Reuss)
48. *Latastia siebenrocki* (Tornier)
49. *Acanthodactylus boskianus* Daudin
50. *Acanthodactylus scutellatus* Audouin
51. *Acanthodactylus vulgaris* Duméril and Bibron
52. *Ichnotropis chapini*, new species
53. *Eremias nitida nitida* Günther
54. *Eremias nitida nigerica* Klaptocz
55. *Eremias nitida garambensis*, new subspecies
56. *Eremias guineensis* Boulenger
57. *Eremias sextæniata* Stejneger

Gerrhosauridæ

58. *Gerrhosaurus zechi* Tornier
59. *Gerrhosaurus flavigularis flavigularis* Wiegmann

Scincidæ

60. *Mabuya maculilabris* (Gray)
61. *Mabuya raddoni* (Gray)
62. *Mabuya affinis* (Gray)
63. *Mabuya sudanensis*, new species
64. *Mabuya büttneri* Matschie
65. *Mabuya wingatii* Werner
66. *Mabuya perrotetii* (Duméril and Bibron)
67. *Mabuya quinquetæniata* (Lichtenstein)
68. *Mabuya striata* (Peters)
69. *Mabuya varia* (Peters)
70. *Lygosoma durum* (Cope)
71. *Lygosoma fernandi* (Burton)
72. *Lygosoma togoense* Werner
73. *Lygosoma kitsoni* Boulenger

74. *Lygosoma sundevallii* (Smith)
75. *Lygosoma læviceps* (Peters)
76. *Lygosoma guineense* (Peters)
77. *Lygosoma simulans* (Vaillant)
78. *Scincopus fasciatus* Peters
79. *Scincus officinalis* Laurenti
80. *Scincus albifasciatus* Boulenger
81. *Chalcides ocellatus* (Forskål)
82. *Chalcides sphenopsiformis* (A. Duméril)
83. *Chalcides de l'Islei* (Lataste)
84. *Chalcides bottegi thierryi* Tornier

CHAMÆLEONTIDÆ

85. *Chamæleon gracilis* (Hallowell)
86. *Chamæleon dilepis* (Leach)
87. *Chamæleon senegalensis senegalensis* (Daudin)
88. *Chamæleon senegalensis lævigatus* Gray
89. *Chamæleon basiliscus* (Cope)

APPENDIX B.— NOTES ON THE TYPES OF HALLOWELL'S WEST AFRICAN SPECIES IN THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, NOT INCLUDED IN THE FOREGOING REPORT

Monopeltis galeata (Hallowell)

Phractogonus galeatus Hallowell, 1852, Proc. Acad. Nat. Sci. Phila., VI, p. 62, figs.; 1857, IX, p. 50. Duméril, A., 1856, Rev. Mag. Zool., (2) VIII, p. 424; 1861, Arch. Mus. Hist. Nat., X, p. 184.
Lepidosternon galeatum Strauch, 1883, Bull. Acad. Sci. St. Pétersbourg, XXVIII, p. 121.
Monopeltis galeata Boulenger, 1885, Cat. Lizards, II, p. 457.
Lepidosternon dumerilii Strauch, 1883, Bull. Acad. Sci. St. Pétersbourg, XXVIII, p. 121.
Monopeltis dumerilii Boulenger, 1885, Cat. Lizards, II, p. 457.
?Monopeltis unirostralis Mocquard, 1903, Bull. Mus. Hist. Nat. Paris, p. 210.

The type (No. 9684) and two paratypes of this species have been examined. Boulenger, in quoting Hallowell's description, questions the number of mandibular teeth, stated to be 5–5. In the type, the base of a sixth, which has been broken away, can be distinguished, and six are present in the paratypes. In 1857 Hallowell states that his drawing of the nasals was incorrect, but does not leave the description quite clear. Instead of being in contact, as in the figure, they are well separated by a rostral, which in the type is longitudinally divided by an impressed line; the error in drawing is obviously due to the faintness of the sutures between the nasals and rostrals and to the more distinct median line. The rostral is especially distinct in the two paratypes. I follow Hallowell's correction of the original locality (Liberia), which is stated in 1857 to be Gaboon.

Eleven, possibly twelve, species of this genus have been described from the region including Kamerun and the Lower Congo. Two of these appear to be closely allied to the species in question, whose distinction rested chiefly on the approximated nasals. The specimens on which *dumerilii* Strauch was founded were previously referred to Hallowell's species by Duméril and were differentiated by Strauch on the basis of the rostral and the presence of a narrow bandlike plate between the two large head shields. Mocquard (1903, Bull. Mus. Hist. Nat. Paris, p. 211), in describing two species allied to *dumerilii*, states that Strauch's narrow cross shield between the two large ones of the head is erroneous, based on the somewhat raised condition of the anterior border of the posterior head shield. This condition is partially developed in the type and still more so in one of the paratypes of *galeata* (No. 9682), as Strauch had rightly inferred from the figure. The distinction of *dumerilii*, then, is confined to the slightly greater number of body rings (210–214, *galeata;* 224–225, *dumerilii*) and seven premaxillary teeth in place of four (or five ?) in *galeata*, in which there are three maxillary and at least two premaxillary on each side. Mocquard (*loc. cit.*) fails to give the tooth formula and his *unirostralis* is distinguishable from *galeata* only by the somewhat fewer (195) body rings. Hallowell's specimens are intermediate between *unirostralis* and *dumerilii*.

Measurements and Scale Characters

Phila. Acad. No.	9682	9683	9684
Length	487	390	421 mm.
Head	15	12	11 mm.
Tail	40	36.5	36 mm.
Annuli to Base of Pectorals	8	8	9
Body Annuli	216	210	214
Tail Annuli	19	19	18
Longitudinal Segments	12 8	10 8	10 8
Preanal Pores	1–1	1–1	1–2
Anal Segments	6	6	6

Poromera fordi (Hallowell)

Tachydromus fordi Hallowell, 1857, Proc. Acad. Nat. Sci. Phila., p. 48.

Poromera fordi Boulenger, 1887, Cat. Lizards, III, p. 6. Günther, 1896, Ann. Mag. Nat. Hist., (6) XVII, p. 264. Boulenger, 1900, Proc. Zool. Soc. London, p 449, Pl. xxxi. Tornier, 1902, Zool. Jahrb. (Syst.), XV, p. 674.

Poromera haugi Mocquard, 1897, Bull. Soc. Philom. Paris, (8) IX, p. 6.

The type of this beautiful species has been reexamined by Dr. Boulenger (1900, p. 449). The measurements and scale counts are here tabulated, with those of a specimen in the American Museum from the Kribi River, Kamerun, for comparison. The colors (Ridgway, Nomenclature of Colors) of the latter specimen are as follows: head, *dark olive;* two mid-dorsal rows of scales and edges of the next row on each side, black, fading posteriorly to the ground color of the body and tail on the base of the latter; on each side of the dorsal black band, on the edges of the second and third scale rows, a narrow light line, *light glaucous blue* anteriorly, changing to greenish before the middle of the body and merging in the general body color several scales anterior to hind legs; this line widens posteriorly to include the whole of the third scale row; the lower half of the third scale row and the fourth, black at the head, fading posteriorly and merging (with the adjacent light line) into the body color five or six scales anterior to the hind legs; the "body color" confined to the sides and rump and upper surface of the tail, *citrine drab;* venter, *glaucous green,* lighter beneath the tail; the large chin shields, the chin, throat, and collar, pale dull *glaucous blue;* enlarged femoral scales, *straw yellow.*

Measurements and Scale Characters

	Phila. Acad. No. 9202	A. M. N. H. No. 5278
Sex	♂	♂
Length		182 mm.
Body	50	57 mm.
Tail		125 mm.
Arm	22	22 mm.
Leg	31	34 mm.
Head Length	14	15 mm.
Head Breadth	8.2	9 mm.
Ventrals, Transversely	23	24
Ventrals, Longitudinally	6	8
Femoral Pores	12–13	13–13
Labials	$\frac{7-7}{8-8}$	$\frac{7-7}{8-8}$
Scales in Collar	11	14

Feylinia elegans (Hallowell)

Text Figure 27

Acontias elegans Hallowell, 1852, Proc. Acad. Nat. Sci. Phila., VI, p. 64, text fig.
?*Feylinia currori* Boulenger, 1887, Cat. Lizards, III, p. 431.
Feylinia currori (*part*) Bocage, 1895, Herpétol. Angola, p. 58.

Under the name of *Sphenorhina elegans* there are in The Academy of Natural Sciences of Philadelphia three specimens, and one labeled *Sphenorhina* species. Of these, the latter and one of the three are specimens of *Acontias elegans* Cuvier, the third is a *Feylinia currori* Gray[1] and the fourth remains as the type on which *Acontias elegans* was based. Its measurements (length, 206; tail, 64 mm.) check satisfactorily with those of Hallowell: length, 207; tail, 63 mm.

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[1] The writer believes that he is justified in identifying this specimen with Hallowell's second specimen of *Sphenorhina elegans*, from Gaboon. It is extremely improbable that the specimens of true *Acontias* came from that locality. It is, however, impossible to check absolutely the identity of the specimen in question, which is at present a mere skin, with the tail missing. There are twenty-three scale rows in place of Hallowell's twenty-two. The matter is further complicated by the citation, in 1857, of two new measurements, neither of them the original of 1852, although he expressly states that he has but two specimens.

Hallowell distinctly states in his original description that the internasals articulate (as they do in the specimen), although his figure shows them separate. The remaining difficulty, his "single scale in front of the anus" is contradicted in the redescription of 1857 which gives "four scales in front of the anus."

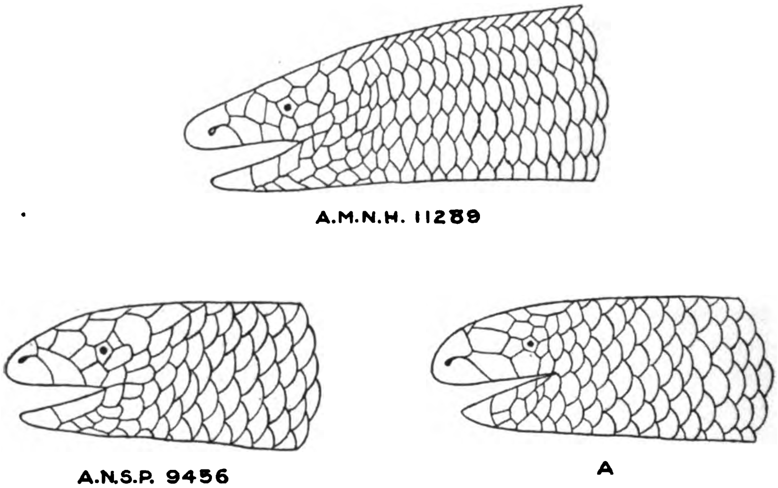

Fig. 27. Heads of *Feylinia currori* (11289, × 1.2), *Feylinia elegans*, type, (A. N. S. P. 9456, × 2.7), and *Feylinia macrolepis* (A, after Boettger).

Hallowell's original description in 1852, with the correction in the figure and number of anals noted, is fairly satisfactory. There are twenty scale rows around the middle of the body, and the ocular is in contact with the second labial, between that scute and the third labial, but well separated from the latter by an anterior prolongation of the lower postocular. This position of the eye in front of, instead of behind, the third supralabial, in combination with the more slender habitus and the low number of scale rows, seems to be adequate to distinguish between *elegans* and *currori*.

Hallowell's remarks in 1857 add almost nothing. After quoting Gray's characters of *Feylinia*, he says "a description which does not fit our animal," and forthwith proposes the genus *Sphenorhina*, founded on a specimen of Gray's *Feylinia currori* and one of *Feylinia elegans*.

The measurements and scale characters of the type of *Acontias elegans* are: length, 206 mm.; body, 142 mm.; tail, 64 mm.; tail/length, .31; head length, 6.5 mm. (evidently not the same measurement as taken by Hallowell); body diameter, 7.1 mm.; body diameter/body length, .050 (cf. this figure for *F. currori*, average .072); anal scales, 4; longitudinal scale rows, 23–30–19. The parietal scute is somewhat more elongate than in the *F. currori* of the Congo collection.

The original locality given by Hallowell in 1852 is Liberia; his failure to mention Liberia in 1857, however, introduces an unfortunate element of doubt as to whether Gaboon is meant as a correction, or whether the failure to mention Liberia is an oversight.

Boulenger, in his report on the Fea Collection (1906, Ann. Mus. Stor. Nat. Genova, (3) II, p. 11) states that specimens of *currori* may have the ocular in contact with the second instead of the third labial, and in the same list accords *polylepis* Bocage full specific rank. It is of course possible that both Boettger's *Feylinia macrolepis*[1] and Hallowell's species, agreeing in the essential point of the position of the ocular, may have to be united with *F. currori*. Pending study of the specimens of all of the species for the status of this character, the writer follows Werner and Boettger in regarding it of specific importance. The essential distinction between *elegans* and *macrolepis* lies in the lack of a loreal in the latter, a character readily explicable on the assumption of a fusion of the loreal with the internasal. *F. macrolepis*, however, does not have the slender body of *elegans*.

The synopsis of the genus on this basis follows.

A. Ocular in contact with the third labial and posterior to it.
  B. Scale rows 19–28; snout moderate .... *currori*.
    C. Scale rows 19–20 .... *currori grandisquamis*.
    CC. " " 24–28 .... *currori currori*.
  BB. " " 28–30; snout elongate .... *polylepis*.
AA. Ocular in contact with the second labial, cut off from third by postocular.
  B. Loreal present; body slender .... *elegans*.
  BB. Loreal absent; body moderately thick .... *macrolepis*.

Chamæsaurus macrolepis (Cope)

Mancus macrolepis Cope, 1862, Proc. Acad. Nat. Sci. Phila., p. 339.
Chamæsaurus macrolepis Boulenger, 1885, Cat. Lizards, II, p. 264. Bocage, 1895, Herpétol. Angola, p. 25. Werner, 1896, Jahrb. Ver. Magdeburg, p. 414. Odhner, 1908, Ark. Zool., IV, No. 18, p. 3. Boulenger, 1910, Ann. South African Mus., V, p. 470.

Bocage (1895, p. 25) finds minute anterior extremities in the adult (not in the young) of this species, and counts twenty-four longitudinal scale rows. Werner, recording three specimens from Natal, describes anterior limbs in two specimens, well developed in one; it is difficult to understand on what basis he has referred his specimens to Cope's species.

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[1] *Feylinia macrolepis* Boettger, 1887, Zool. Anz., X, p. 650; 1888, Ber. Senck, Ges., p. 35. Werner, 1902, Verh. Ges. Wien, LII, p. 342.

The following notes refer to the type (No. 9709). Rostral broad, emarginate behind on either side, forming a blunt median point between the nasals. Nasals large, entire, meeting behind the rostral, the nostrils pierced somewhat posteriorly in their lateral face. Frontonasal elongate, situated between the prefrontals and the nasals, in contact with the frontal, with curved suture. Frontal in contact with the two large supraoculars on each side, with the frontoparietals posteriorly and the prefrontals anteriorly. Enlarged parietals two pairs, the interparietal as long as the two parietals, and separating the posterior pair. The distinct pineal eye is situated anteriorly on the interparietal. The head shields on top of the head, except the nasals, are many keeled, the frontonasal and the frontal least rugose. There are three supraciliaries, the anterior much the longest. There are four pair of enlarged chin shields, the anterior in contact. Mental large, nearly as long as broad, with a median point between the first chin shields. A large postnasal; two loreals, of which the anterior is the larger, and deeper than long. The subocular (= fourth labial) extends anteriorly above the third labial, and extends slightly posteriorly. A sharp keel beginning on the second loreal extends on this plate below the eye. (See below for scale counts and measurements.)

The paratype (No. 9708) presents considerable differences in the head shields. The frontonasal is divided by a transverse suture into an anterior pentagonal and a smaller posterior rectangular part. The interparietal is shorter than the parietals, the posterior pair meeting behind it. Nasals more elongate, the nostril at their center. The supraoculars are three on each side (i. e., posterior ocular transversely divided).

Measurements and Scale Characters

PHILA. ACAD. NO.	9708	9709
Length	444	638 mm.
Body	85	138 mm.
Tail	359	500 mm.
Leg	5	7 mm.
Head Length	13	17 mm.
Head Breadth	6	8 mm.
Length of Snout	5.5	7.5 mm.
Scales about Body	22	22
Scales from above Anus to Occiput	40	39
Labials	$\frac{5-5}{6-6}$	$\frac{5-5}{5-6}$
Anals	9	9
Femoral Pores	3–3	1–1

EXPLANATION OF PLATES VII–XXXII

Plate VII

The Border of a Clearing in the Ituri Forest toward Nala. A swampy depression in the foreground with typical plants of the secondary growth in the space cleared for the road: at the right of the bridge, elephant grass (*Pennisetum benthami*) and a young musanga (*Musanga smithi*); the slender tree in the left center is a *Uapaca*, and the broad-leaved bush in front of it a *Vernonia conferta*. Primary Rain Forest in the background, the majority of the trees being *Cynometra alexandri*, often reaching 150 feet. A few oil palms are visible toward the road.

Plate VIII

Interior of the Rain Forest on the Watershed between the Ituri and Uele Rivers, between Nala and Rungu. Tree ferns (*Cyathea*, probably *C. laurentiorum*), some of which reach 20 feet, in the swampy depression at the cênter. The heavily buttressed tree at the left is a muhindi (*Cynometra alexandri*) and that with a columnar trunk on the right is a mambao (*Macrolobium dewevrei*). The left front corner shows typical ground cover of the Rain Forest with large-leaved *Phrynium* and the broad-bladed forest grass (*Leptaspis conchifera*). Note also the huge creepers (*Landolphia*, *Lonchocarpus*, and others), hanging down from the crowns of the trees. The Rain Forest represents one of the primary divisions of the Ethiopian Region, both in its flora and fauna.

Plate IX

Typical Aspect of Open Country in the Northeastern Uele, along the Road from Niangara to Faradje. The flat or slightly rolling country is covered with moderately high grass (*Imperata cylindrica* and various species of *Andropogon*); scattered, medium-sized trees from 20 to 30 feet high (*Dombeya*, *Kigelia*, etc.); and irregular scrubby bushes (*Bauhinia*, *Combretum* and others). A thorny element is represented by a few species of *Acacia* and the widely distributed *Zizyphus jujuba*.

Plate X

The Savannah North of Garamba, on the Watershed between the Nile and Congo Basins. The vegetation is typical of the transition zone between the mixed Uele flora and that of the Sudanese Subprovince (cf. Map 2). The grass is shorter and is chiefly composed of smaller *Andropogons*. Larger trees (such as *Lophira alata*) are very rare. The smaller woody plants include a great variety of species: *Protea*, *Sarcocephalus*, *Bauhinia*, *Dombeya*, *Uapaca*, *Grewia*, *Gardenia thunbergia* and others. In the depressions of the rocks, where moisture and humus accumulate, grow various grasses and a dwarf species of *Aloe*. Plates IX and X may be taken as representing an aspect of the second faunal and floral division of the Ethiopian Region, the Savannah Province; they also represent the first of the faunal subdivisions, the Sudanese Subprovince, which extends somewhat further toward the forest border than does the botanical division.

Plate XI

Figure 1. *Kinixys erosa* (Schweigger). The average size of the adult is probably 200–230 mm.

Figure 2. *Kinixys belliana* Gray. A. M. N. H. No. 10042; length 230 mm.

Figure 3. *Pelusios nigricans* (Donndorff). A. M. N. H. No. 10063; ♂; length 290 mm.

Plate XII

Figure 1. *Crocodylus cataphractus* Cuvier. A. M. N. H. No. 10072; juvenile.

Figure 2. *Crocodylus niloticus* Laurenti, the common African crocodile. Photograph used by courtesy of the New York Zoölogical Society.

Plate XIII

Figure 1. *Osteoblepharon osborni*, new species. Total length 130 cm.

Figure 2. *Osteolæmus tetraspis* Cope. Total length 142 cm. Photograph by courtesy of the New York Zoölogical Society.

Plate XIV

Figure 1. *Hemidactylus brookii* Gray. A. M. N. H. No. 10254; ♀; length 122 mm.

Figure 2. *Lygodactylus picturatus gutturalis* Bocage. Dorsal view. A. M. N. H. No. 10325; ♂; length 78 mm.

Figure 3. *Lygodactylus picturatus gutturalis* Bocage. A. M. N. H. No. 10325. Ventral view with characteristic throat marking.

Plate XV

Figure 1. *Hemidactylus fasciatus* Gray. A. M. N. H. No. 10265; ♀; length 168 mm.

Figure 2. *Hemidactylus ituriensis*, new species. A. M. N. H. No. 10270; ♀; length 162 mm.

Plate XVI

Hemidactylus ituriensis, new species, showing a variant coloration. A. M. N. H. No. 10273; ♀; length 137 mm.

Plate XVII

Figure 1. *Hemidactylus richardsoni* Gray. A rare forest gecko, protectively colored. A. M. N. H. No. 10279; ♀; length 130 mm.

Figure 2. *Lygodactylus depressus*, new species. A. M. N. H. No. 10342; ♀; length 72 mm.

Plate XVIII

Figure 1. *Agama atricollis* Smith. A. M. N. H. No. 10489; ♂; length 330 mm.

Figure 2. *Agama colonorum* Daudin. A. M. N. H. No. 10408; ♂; length 303 mm.

PLATE XIX

Varanus exanthematicus exanthematicus (Bosc). A. M. N. H. No. 10494; length 650 mm.

PLATE XX

Figure 1. *Varanus exanthematicus exanthematicus* (Bosc). A. M. N. H. No. 10494. Characteristic attitude when annoyed.

Figure 2. *Gerrhosaurus zechi* Tornier. A. M. N. H. No. 10722; ♀; length 302 mm.

PLATE XXI

Lacerta langi, new species. A. M. N. H. No. 10525, type; ♀; length 275 mm.

PLATE XXII

Bedriagaia tropidopholis Boulenger. A. M. N. H. No. 10528; ♂; length 398 mm.

PLATE XXIII

Figure 1. *Algiroides africanus* Boulenger. A. M. N. H. No. 10534; ♂; length 163 mm.

Figure 2. *Holaspis guentheri* Gray. A. M. N. H. No. 10709; ♂; length 118 mm.

PLATE XXIV

Figure 1. *Mabuya polytropis* Boulenger. A. M. N. H. No. 10895; ♀; length 321 mm.

Figure 2. *Feylinia currori* Gray. A. M. N. H. No. 11294; length 340 mm.

PLATE XXV

Mabuya sudanensis, new species. A. M. N. H. No. 10934, type; ♀; length 264 mm.

PLATE XXVI

Mabuya perrotetii (Duméril and Bibron). A. M. N. H. No. 10955; ♂; length 248 mm.

PLATE XXVII

Figure 1. *Mabuya quinquetæniata* (Lichtenstein). A. M. N. H. No. 11025; ♂; length 233 mm.

Figure 2. *Mabuya quinquetæniata* (Lichtenstein). A. M. N. H. No. 11022; ♀; length 220 mm.

PLATE XXVIII

Figure 1. *Lygosoma reichenowii* Peters. A. M. N. H. No. 11196; ♀; length 123 mm.

Figure 2. *Lygosoma breviceps* (Peters). A. M. N. H. No. 11197; ♂; length 160 mm.

Plate XXIX

Lygosoma sundevallii (Smith). A. M. N. H. No. 11225; ♂; length 179 mm.

Plate XXX

Figure 1. *Chamæleon gracilis* Hallowell. A. M. N. H. No. 11335; ♀; length 239 mm.

Figure 2. *Chamæleon senegalensis lævigatus* Gray. A. M. N. H. No. 11394; ♀; length 177 mm.

Figure 3. *Rhampholeon boulengeri* Steindachner. A. M. N. H. No. 11576; ♀; length 66 mm. Matching the light gray stump upon which it rests. Compare the color phases shown on Plate XXXII, Figures 7 and 8. The two oblique marks on the back have been compared with the ribs of a dead leaf.

Plate XXXI

Figure 1. *Chamæleon owenii* Gray. A. M. N. H. No. 11425; ♂; length 303 mm.

Figure 2. *Chamæleon ituriensis*, new species. A. M. N. H. No. 11494; ♀; length 213 mm.

Plate XXXII

Figures 1–5. Successively darker color phases in *Chamæleon ituriensis*, new species. A. M. N. H. Nos. 11521–22; length 196 and 234 mm.

Figure 6. *Chamæleon owenii* Gray. A. M. N. H. No. 11439; ♂; length 250 mm. The color usually assumed in bright sunlight.

Figures 7–8. Two color phases of *Rhampholeon boulengeri* Steindachner. A. M. N. H. No. 11607; ♀; length 65 mm.

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